THE

Home Mechanic

AND

COMPLETE SELF-INSTRUCTOR

IN

CARPENTRY, PAINTING, HORSE-SHOEING, SOAP MAKING, CANDY MAKING, BAKING, TAXIDERMY, TANNING, &c.

BY

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AND OTHER SPECIALISTS.

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PRACTICAL CARPENTRY.

THE CARPENTER'S TOOL CHEST.

The Carpenter's Tool Chest is a wooden box about 3 feet long, 2 feet wide and 2 feet high; the body of the box of plank one inch thick dovetailed together. In our engraving we show the chest with one end removed, by which the interior arrangement can be seen. The material for a chest must be well seasoned, otherwise the shrinkage of sides will cause the lids and trays to bind. White pine of inch thickness is good for the body of the chest; dovetails should be snug all through, not only because a tool chest should be an advertisement of a carpenter's workmanship, but when filled it is so heavy that strength requires that every part should fit well. The bottom of the chest is of narrow boards tongued and grooved together, because, as chests are often set upon damp floors, the narrow boards of the bottom are not so much affected by it as wider ones would be. The chest lid is framed, that is instead of being all in one piece it is made of several pieces joined together, and is therefore less liable to shrink or swell. That we may understand what a piece of frame work is, in fig. 2 is given a little drawing of the lid. In this lid all the pieces, stiles, rails and panels are one inch thick; the stiles have oblong square holes called mortices, made in them as shown on edge cf stile, and by the dotted lines; at the end of the rails are the *tenons*, formed by the saw, which fit exactly into the mortices; their business is to hold fast in the mortices, for the good workman not only makes the tenons to fill the mortices exactly, but when the panels are in he drives in at the end of each tenon a narrow wedge dipped in glue, by which the stile is held fast to the rail. The panels are made to fit exactly the space enclosed by the rails and stiles and are held in place by a tongue cut on their edges, which fits into a groove cut all round in the

inner edges of the stiles and rails, as shown on the section, for by the section we have a view of the lid as it would appear if cut straight through panels and rails. In our chest lid the panels, rails and stiles are all of the same thickness, and the joints are so neatly made that we can hardly tell that it is not all one solid piece. The base and necking of our chest is of oak, $\frac{5}{8}$ inch thick, and neatly dovetailed at the corners; it is screwed on to the body of the chest, and edges of the lid On the top of the lid, we find on the sides and edges of the

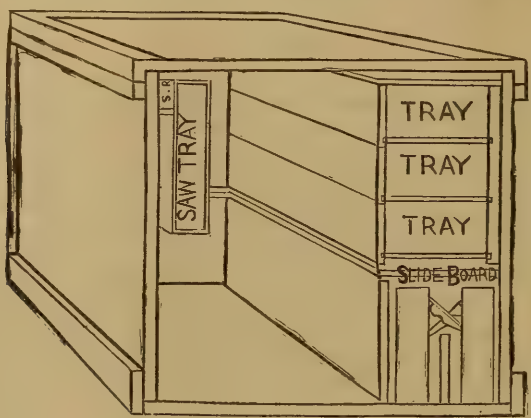


Fig. 1.—Carpenter's Tool Chest.

lid, strips of hoop iron $\frac{1}{16}$ inch thick and 1 inch wide, neatly let in even with the top surface of lid—or "flush" as it is called—and screwed on. The object of putting on this iron is to prevent the top edges of the chest lid from becoming torn by the saw in case any one should use our chest as a saw-horse; it will also prevent the corner being marred by heavy pieces of stuff falling against it, as they may accidentally do.

Our chest, we will mention, is painted of a sober drab or stone color on the outside as it is the best for wear, and there are stout flush heavy iron handles at each end, while the lid is hung with three heavy brass butts.

Now we will raise the lid and look into the interior. We find that the trays, the slides on which they run, and all the fittings on the inside are of hard wood, well oiled and rubbed; the trays are dovetailed together, and the partitions in the compartment under the trays are grooved or "dadoed" into the sides.

The first thing we see in the open chest is the *square rack*, on the front side just under the lid; it is a shelf about 1½ inches wide, with slot cut in it in which we find the tongues of the steel and try squares, while the blades and stocks rest on the rack. The steel square is very much used in putting up the frames of buildings, and indeed in all work.

We also find the try squares in the square rack; they are used for trying the edges of the plank when they are jointed up at the bench. The panel square resembles the try square

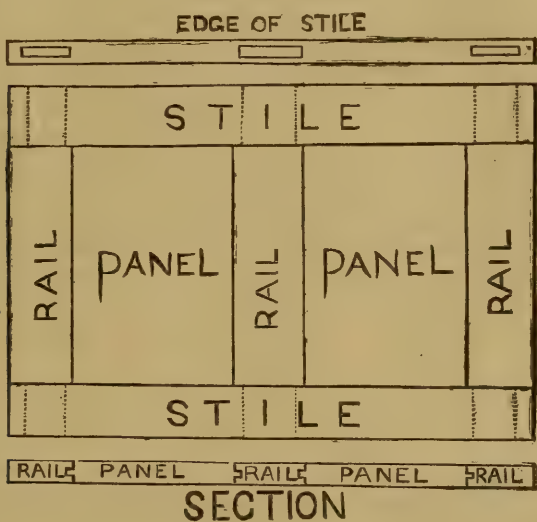


Fig. 2.—Carpenter's Tool Chest.—Sectional View.

in appearance, but the blade is longer; the square is used to make shoulders of inch panels and rails on shop work; it is seldom taken out to the building.

The bevel is a square with a shifting blade; it is used for jointing up stuff to any required bevel, as for instance in getting out staves for a column; it is also very handy about a building.

We will now open the saw tray in which we find the rip and cross cut, the back, and compass saws.

The rip saw and manner of using it are shown in fig. 3, page 13. It has 8 teeth to 3 inches, and is 28 or 30 inches long in the blade. The teeth are intended only to cut stuff length-

wise with the grain, they are "set," that is one tooth is bent out beyond the surface of the side of the blade on one side, and the next tooth is bent the other way, and so alternating, so that in case the material to be ripped is damp, the set of the teeth will clear sufficient space for the blade. Saws are set with a little instrument called a *saw-set*, of which there are many varieties. This instrument is usually regulated by a thumb-screw at the end, by which the set may be made either coarse or fine. When this screw is out its full length a saw set with it would have a very coarse set the further it is in, the finer set it will give. When we set a saw, we bend every other tooth all along one side, then turn the blade over and bend the alternate teeth to the other side.

Saw Filing.—The saw is a series of knives set on a line; every tooth is a knife, and cuts a small portion of the material; each is kept from cutting too deep by the tooth on either side; each tooth should cut its allotted chip or slice of the material, carry it along and drop it on the outside. The perfection of the saw is for it to cut fast and smooth with the very least expenditure of power. To do this it is evident that every tooth should be so constructed as to do its own proportion of work, for if one tooth is out of shape, or out of line with the others, it is not only useless but a hindrance and disadvantage to the rest.

We find many good mechanics that always used saws who frankly acknowledge that they never could file a saw, satisfactorily to themselves at least. The reason probably is, they never studied the principle of the working or action of the instrument. There is no reason why a man who knows enough to use a saw, should not be able to put it in complete order, although it is more of a science than many would imagine.

It is astonishing what miserable saws are sometimes used by mechanics, or those claiming to be such. The only way they can be coaxed or driven through the wood is by having an enormous set, a liberal use of oil, and another lubricator called elbow-grease. The difference between the work of one of these saws and one in proper order is about the same as that between a hole bored by a sharp auger and one gnawed by rats. It brings to mind the remark of the wood-sawyer, who, puffing and blowing from the exertion of using a bad saw, said, "Of all the saws I ever saw saw, I never saw a saw saw as this saw saws."

Our object with the cross-cut is to sever the fibers or threads of the wood, and as the material is non-elastic or unyielding

we must cut each fiber in two twice, so as to leave a small groove or *kerf* as we proceed, so that the material will not bind or pinch as the saw passes through the wood, owing to inequalities in the blade of the saw.

A saw should be filed so truly that it shows an angular groove along its whole length on the edge, so that a fine needle will slide the whole length of the saw without falling off. The cutting is all done with the outside edge of the tooth, the wood crumbling out from point to point of each tooth as the saw moves.

Now the sharper each tooth is—that is, the more bevel on the point, the deeper it will cut, but it must not cut any deeper than will crumble out across to the point of the other tooth. This is the difference between saws for hard and soft wood. If a saw for hard wood has too much bevel on the point it will score deeper into the wood than it can carry out the chip, so that it will keep moving up and down in the same scores and not accomplish anything. It follows then that for soft wood we may file the back edge or point of the tooth quite beveling, while the harder or tougher the wood the less

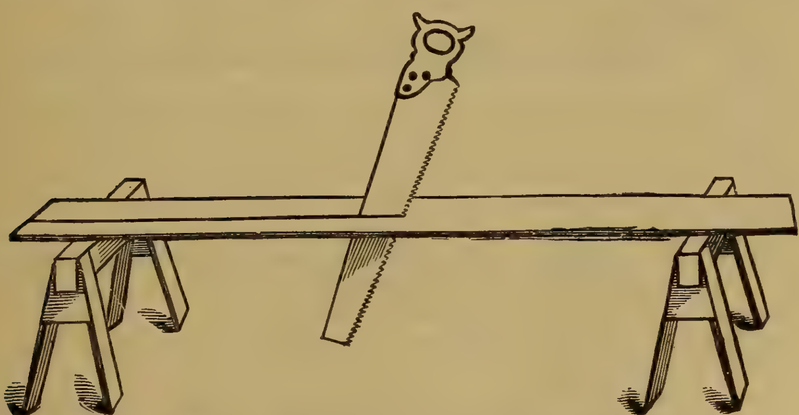


Fig. 3.—*Rip Saw and manner of Using.*

bevel we must file the back of the tooth, for the bevel of the back of the tooth governs the bevel of the point, being regulated by the angle at which the file is held.

The cutting edge of a tooth should incline rather than be perpendicular. It is a common fault with cross-cut saws, to make the teeth too hooking, as it is called. The idea is that the saw takes hold better. This may be true, but it will

be like the man's razor that took hold first rate, but didn't let go worth a cent.

Using the Rip Saw.—The rip saw, as we have said before, is only to be used in cutting stuff lengthwise, when the cut to be sawed is over two or three feet in length. It is usual to mark the cut with a chalk line, which is generally a stout cotton fish-cord, kept wound on a chalk reel. With this reel generally comes a *scratch awl.* To use the chalk-line, tie a loop in the end and fasten it with the scratch-awl at one end of the line to be cut; rub the line with a piece of white chalk, and pull it tight over the other end of the required line; lift it between the two and let it snap on the board, and a straight white line appears below it. The chalk line is very handy about a building to mark straight lines on floors, on ceilings to set patterns by, on roofs to lay shingles on straight lines, &c.

As we have got a straight line on our board, we commence to saw. We must never jam or push a saw through a cut; by doing so, we can never cut as fast; we waste our strength, and if we put on pressure when the end of the blade is near the top of the plank, we are apt to bend and "buckle" it, that is, cause a little check or split between some particles of steel in the blade, and render the saw worthless. Beginners must learn to hold the saw perpendicular, square with top of the plank, and at first we can apply our try square alongside the blade at the end of the first few strokes, place it in the angle formed by our saw-blade and the top of the plank; if that angle is the same as our try square we are sawing plumb. It is important at the very outset to do this right.

From our desire to cut fast we can't help bearing too heavily on the saw at first, and find it difficult to cut the line. Remember to bear on lightly, and not to force or jam the saw; you will get on much faster, and do the work a great deal better.

Cross-Cut Saw.—The cross-cut saw is similar in general appearance to the rip saw. It has a blade 26 inches in length, and has 15 teeth to 4 inches or more, according to fineness. The teeth are formed differently from those of the rip saw, and this saw is only used, as its name implies, for cutting across the grain. The same care should be taken to saw square up and down, and to be sparing of force as has been directed in the case of the rip saw.

Back Saw.—The back saw (fig. 4, page 15) has a thin blade with fine teeth; it is kept straight and stiff by a brass or steel

back. It is of various sizes, and is used generally on the work-bench in the shop for cutting across the face of dressed work, as the cheeks from the sides of tenons, dovetails, &c.

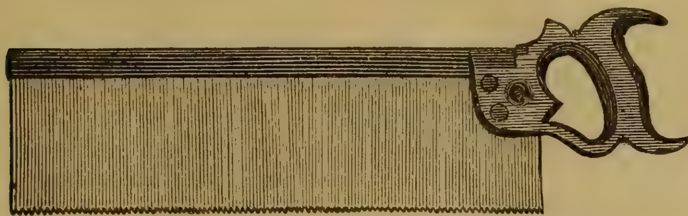


Fig. 4.—*Back Saw.*

Compass Saw.—The compass saw has a very narrow but tolerably stiff and heavy blade; it is used for cutting out curved or circular lines, and is also handy in the building to start cuts in narrow places where the wider blade of the other saws will not enter, and here we will again repeat our cau-

Fig. 5.—*Compass Saw.*

tion about *forcing* a saw; *don't* push the compass saw, or you will be apt to break it off short, as the blade fs narrow; keep it sharp and let it run lightly.

Besides the saws we have mentioned a carpenter will sometimes need a dovetail saw for fine work, which is only a small back saw with fine teeth; and a key-hole saw, which is a light fine compass saw blade set in a handle into which saws of different kinds can be fixed.

Bench Planes.—We have now examined the contents of the saw tray. We will look into the large space between the other trays and the front of the chest. Here when the chest is packed, we find the bench planes, so called because the carpenter, when at work in the shop, needs them all the time, and they always lie at the head of the bench ready to hand. They are the jack plane, fore plane, jointer, and smoothing plane.

Jack Plane.—This is 18 inches long, and carries a 2¼ inch iron it is used to take off the rough surface of plank from the saw-mill, and also to remove considerable inequalities when required. The iron is ground rounding, so that more edge projects from the center than toward the sides when the iron is set in the plane; but we will describe that matter more fully further on in our present little volume. (See page 17.)

Fig. 6.—Jack Plane.

The Fore Plane.—This plane is from 18 to 22 inches long, with an iron 2⅜ or 2½ inches long; it is used for "trying up," or bringing the surface of a board to a level surface,

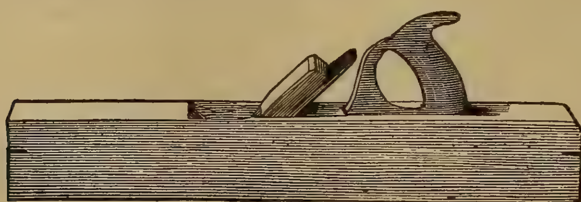


Fig. 7.—Fore Plane.

after the jack plane has taken off the rough. We take off the shavings the whole length of the stuff with it, and when using it occasionally lay it on one lower edge crosswise of the stuff, to see where the surface is uneven, and wants bringing down.

The Smoothing Plane.—This is 7 to 9 inches long, with a 2 or 2½ inch iron; it is used as a finishing plane to smooth off the joints in any framed work after it is put together, and to put a smooth surface on most house finishing lumber. The iron should be kept fine set and sharp, so that the plane will take off a thin silky shaving. We show two common forms of the smoothing plane in figs. 8 and 9, on this and the succeeding page.

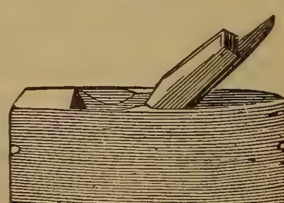


Fig. 8.—Smoothing Plane.

The Jointer.—This is a plane of from 24 to 30 inches in length, used for bringing the edges of the stuff straight, as in the stiles and rails of doors, when preparing joints to be

glued up, door and window cssings and trimmings, and any other purposes where straight joints are required. When using it we take a shaving off the full length of the stuff, walking along as we push the plane, occasionally sighting along the edge from the end. By closing one eye we can see where a long hollow or rise in the edge requires a few extra shavings just here or there to make it true. While using the jointer we carry in our left hand the small try square if we are jointing work that must be exactly square, as all framed work must be to be tight, and we test the squareness of our joint every little while, and regulate our shaving from one side or the other as required.

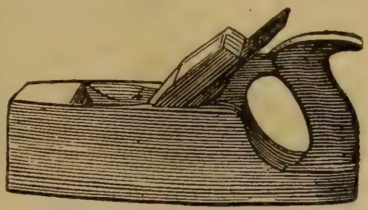


Fig. 9.—Smoothing Plane.

Fig. 10.—The Jointer.

Treatment of Bench Planes.—When we purchase a set of bench planes (and as they are so constantly in use it pays to get the best), we should give them at least three good coats of the best raw linseed oil, taking care to let the oil sop well into the ends; this prevents the planes from checking, renders them less liable to be affected by dampness, and makes them a trifle heavier, which in the case of the fore plane and jointer is an advantage. Bench planes should be kept true in the face; they are apt to wear and become "winding," as shown in fig. 01, and it becomes necessary to dress it true; to do this, put another plane in good order, and set very fine, so that it may take off very thin shavings; put the plane to be operated on in the bench screw; do not remove the iron or wedge, however, but set the iron about ¼ inch below the face of the plane. If there be a hollow or curve in the piece you can sight along the edge, detect and

remove it, as in the case of an ordinary piece of stuff, but if the face is "in wind," or "winding," get two steel squares, place the blades so that one will be across the front, the other

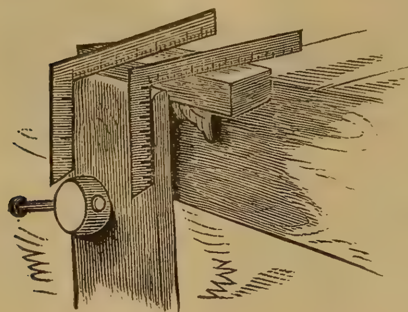


Fig. 11.—*Winding.*

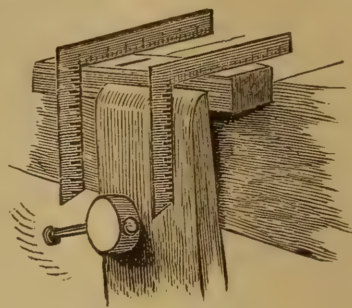


Fig. 12.—*Not Winding.*

across the tops. Fig. 11 shows a plane, of which the face is seen to be very much winding; fig. 12 shows the blades of the squares as they appear when the winding of the face has been planed off.

The Plane Iron, fig. 13, is composed of two pieces; the upper one in the illustration is the cutting iron, which is of steel; it has a slot or long narrow hole cut in it, with a large round hole at the upper end of the slot. The lower piece in our drawing is called the cap iron; it is fastened to the other by a screw, and when the screw is loose it slides easily in the slot, and can be detached by sliding up the round hole. The edge of the iron proper can be regulated to cut with various degrees of fineness by the cap being set and screwed fast at certain distances above it. In cross-grained and curly wood the cap iron should be set close over the edge, to prevent the iron from taking out deep chunks of wood as it would were the cap set some distance from the edge; but the great secret of doing smooth work with the plane or any other tool is to have a sharp edge; indeed, old carpenters tell us that when a boy has learned how to keep his tools sharp and in good order, he has learned half his trade.

Fig. 13.—*Plane Iron.*

The plane iron is sharpened on the grindstone. The new beginner must guard against giving too long a bevel to his plane irons, that is, making *too thin* an edge; for although a thin edge cuts well, some steel is very apt to break at hard

knots in the wood ; and if we have a thin edge, it may take a long rubbing on the oil-stone to take out the nick, or we may even have to resort to the grindstone again.

THE HAMMER.—Those who "never can drive a nail without splitting the board" may readily overcome this. Looking at a nail you will perceive that for some distance under the head, the nail is broader than it is below; now a nail must always be driven so that this broad side is on a line with the grain, not at right angles to it ; if at right angles, the wood is sure to split, as every blow with the hammer tears apart the fibers ; whereas, if the nail be driven with broad side on a line parallel to fiber or grain of wood, the broader part wedges in lengthwise, and makes the nail hold strongly. To drive a nail well however needs practice. Never get a cheap iron hammer, such a one as you will see lying in a tray in front of a Cheap John hardware store at 25 cents, having only an iron face ; the striking surface soon becomes rounding, and one is as likely to crush a finger or mar the surface of the wood as to drive a nail home with such a hammer.

THE NAIL SET is a little piece of steel of 3 or 4 inches in length, generally made of an old round file ; it is used to set the nail head below the surface of the wood, where the holes are to be puttied up and the work painted.

THE MALLET.—The mallet of the carpenter is generally of lignumvitæ, or other hard wood. It is used to strike the head of the chisel in mortising, &c., as it is not liable to split the wooden handles of the chisels, as the hammer is almost sure to do.

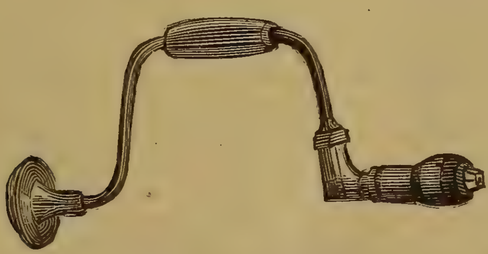


Fig. 14.—*The Brace.*

THE BRACE AND BIT.—We generally find the brace stowed away with the bench planes, &c., in the front part of the chest. Braces are made of wood bound with brass, or of iron or steel. We show in our engraving one of the latter.

Into the end are fixed various "bits," some of which we show in figs. 15 to 22, as "countersink," "reamers," and "taper shell bits," for boring and widening out holes in wood and metal.



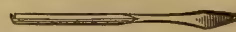


Fig. 15.—*Spoon Bit.* *Fig.* 16.—*Center Bit.* *Fig.* 17.—*Lip Bit.*

THE REAMER.—This bit is used for widening out holes in metal; for instance, in an iron hinge the holes in which are a little too small for the screws.


Fig. 18.—*Reamer.* *Fig.* 19.—*Conntersink.*

THE COUNTERSINK.—This bit is used for widening out the hole at top, so that the screw may be driven in and its head appear level with the surface.


Fig. 20.—*Auger Bit.* *Fig.* 21.—*Pod Bit.*

THE AUGER BIT.—The common form of auger bit is shown in fig. 20. There are two cutters in this bit, one on either side, and they are apt to wear down, and then the bit is good for very little. The best and most rapidly cutting auger bit is made by giving a curve to the cutting edge. They can be kept sharp by the rat-tail file.

THE SCREWDRIVER BIT is very handy, as by it screws can be turned in much more rapidly than by the ordinary screw-driver, which is quite a consideration whenever there are a good many screws to turn in, and we have the work on the bench in a position where we can use the brace with ease.

Fig. 22.--*Screw-driver Bit.*

GAUGES.—The gauge is used for drawing lines on a piece of stuff parallel to one of its edges. By the scale of inches on the side of the head the gauge can be set at the required distance from the little cutter near the end on the lower side, and made fast by the wooden thumb screw in the head, then by sliding the gauge along the straight side of a board, a shallow cut is made. The gauge is used in getting out strips, &c., of uniform width on the bench. After a straight edge is planed on one side we mark with the gauge the required

width, and then plane or saw off the wood beyond it. Gauges are generally made of hard wood.

THE MORTISE GAUGE has two markers, and besides a sliding head with screw; it has also a screw slide, on the end of which is fixed one of the markers, whose distance from the

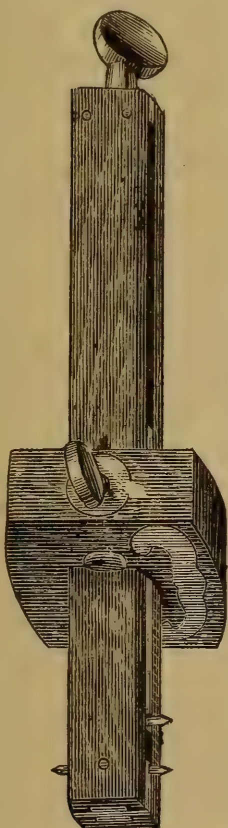


Fig. 24.—Patent Mortise and Marking Gauge.

Fig. 23.—Improved Patent Gauge.

other can be regulated by the screw at the end. This gauge is used for marking out the mortises and tenons in framed work, as doors, or as in the chest lid shown in fig. 1, page 10. The mortises are cut out with chisels, and the tenons set in the bench screw, and cut down with the rip saw. There are also panel gauges for marking the width of broad panels, and

cutting gauges, in which the points are knives which make a cut of a quarter or half an inch in depth.

The Stanley Rule and Level Company, New York, make gauges with several valuable improvements. One consists in substituting for the ordinary point, which is driven into the bar of the guage, a long and nicely tempered steel point, which is held firmly in its place in the slot at the end of the gauge bar by a screw, shown in fig. 23. When the use of a gauge mark is necessary nearer the corner of inside work than an ordinary gauge will work, the adjustable point can be inserted at the extreme end of the bar, and outside of the screw. Another, included in all the better quality of gauges, is a brass shoe, which is inserted in the gauge head between the bar and the end of the screw, to protect the gauge bar from being dented or made uneven by the action of the screw. They make also a patent mortise and marking gauge, shown in fig. 24, with the shoe, and embracing a method of regulating one point of the mortise gauge by a thumb-screw at the end of the bar. Another is a the patent double gauge, having two wooden bars, both of which are graduated. By its use rapidity is promoted in turning off work which requires gauging at two distinct points. The tool may be used for a mortise gauge by setting the two points at the required distance apart, and turning the gauge in the hand as it is pushed forward or drawn backward. Both bars in this gauge have the brass shoe.

The Spirit Level is generally made of mahogany. It is used for testing horizontal and perpendicular surfaces, as in setting window and door frames, and other work about a house. There is on the upper edge a small glass tube filled with alcohol, with only a little bubble of air left in it. When the level is placed horizontally the bubble stands in the center of the tube. If not horizontal it is at the highest end. In the same way, when the edge is placed against any upright surface, the bubble in the other tube, seen through the round hole toward the left end, tells us if the thing is exactly plumb, and if not, which way it must be moved to make it so.

A cheaper form is the pocket level ; it is a small iron case containing the alcohol tube with bubble, and it has a screw on the side by which it can be fastened to the steel square blade about its center ; two little guards at each end rest on the edge of the square, and if care is used always to have them snug on the edge the pocket level may serve very well. The pocket level may be used to plumb with, by fastening it

on the tongue of the steel square, and placing the edge of the blade against the object to be tested.

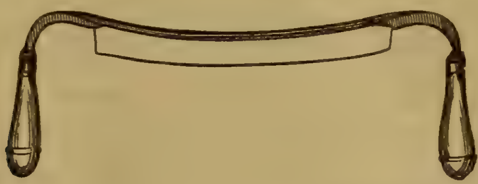


Fig. 25.—Drawing Knife.

The Drawing Knife is a well-known tool. It is a blade with a handle at each end, and is used to roughly shave off surfaces, by drawing it toward the body.

We have now enumerated the ordinary tools which when put away are placed in the front part of the chest. The back of the chest is occupied by the three trays which slide on hard wood ledges; under these is the compartment for the stowing of the bead, rebate (rabbet), and match planes, the hollows, rounds and fillisters. These little planes, unlike the bench planes which discharge their shavings through a top opening, let their shavings pass out at the side, and have no top handles.

The Rebate Plane is used for sinking rebates. The fillister may be classed as a rebate plane. In fig. 26 is shown one with a stop and cutter; the stop is the guard on the side, which is secured in its place in the side by a screw, and can

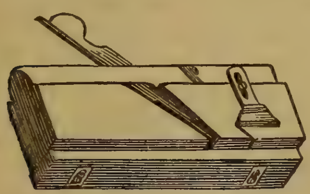


Fig. 26.—Rebate Plane.

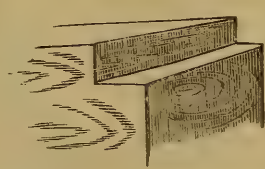


Fig. 27.—A Rebate.

be moved up and down by means of the slot in the guard ; it regulates the depth of the rebate, for of course when the iron has cut down the wood till the stop touches the top surface of the stuff it is prevented from cutting deeper. The cutter is a little knife-point just under the left end of the guard. As it runs before the cutting edge when the plane is in use, it

prevents the iron from leaving a furry side to the cut. The piece below can be moved by means of the two slots, and set by the screws so as to regulate the width of the rebate. A common instance of rebating is in the jamb of the ordinary door frame to which the door is hinged, and into which it closes.

The Match Planes are in pairs, one makes the tongue, the other the groove, for what the joiner calls "worked joints." The ordinary floor plank, tongued and grooved, are examples of the work which a match plane does. We will generally find three pairs of match planes in the well-furnished chest, for ½, ⅞, and ¼ inch stuff.

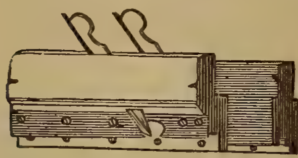


Fig. 28.—Match Planes.

The Plow is a tool much used by the carpenter in shop work. It is used for making grooves of various widths and depths at various distances from the edge of the plank. The distance of the groove from the edge of the plank is regulated by the screw arms, by which the distance of the guard from the plow iron can be changed. The screw in the top raises or lowers a little iron plate just above the plow iron, by which the depth of the cut is regulated. Plow irons are of different widths, from one eighth to three quarters of an inch.

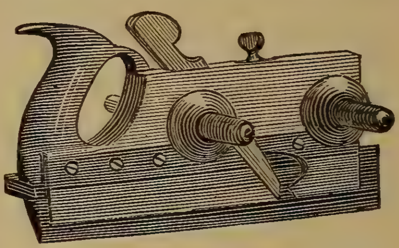


Fig. 29.—The Plow.

Besides the planes we have mentioned there are the *hollows* and *rounds* for forming shapes, of which figs. 30 and 31 are sections. They are used in working out odd-shaped molding. The carpenter used also to be provided with a number of molding planes, but steam mills now work them so cheaply that the carpenter at present seldom needs them.

Fig. 30.

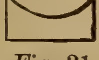


Fig. 31.

Beads.—The sizes of the beads used by the carpenter vary by ⅛ of an inch from a plane which forms a bead an inch in width, to ⅛ of an inch wide. When a bead is worked as shown by the dotted line, it is said to be "returned." The edges of window and door casings are often beaded; as are also

Fig. 32.—Bead.

the joints of narrow boards in partitions, ceilings and wainscoatings.

THE DADO looks something like the rebate plane, but is used for cutting grooves across the stuff, and has a cutting point on either side in front of the iron. These points cut the fiber and prevent the iron from tearing the wood at the sides of the groove. The dado has also a *stop* to regulate the depth of the groove. A common instance of dadoing is the grooves cut in the upright to admit the shelves in store shelving. Sometimes in good houses a dado is cut in the floor all round the walls of the rooms, to admit a tongue on the bottom of the base boards; in that case of course the shrinking of the base, by drawing up the tongue from the dado, leaves no unsightly open crack next the floor. To guide the dado, a light strip must be tacked down on the line of the intended groove.

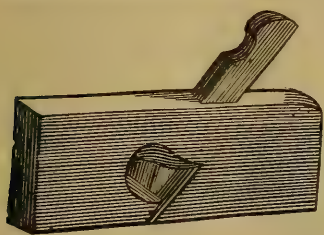


Fig. 33.—The Dado.

PATENT ADJUSTABLE DADO, FILLESTER, PLOW, &c.—This tool, represented in fig. 34, consists of two sections—a main stock, with two bars or arms, and a sliding section having its

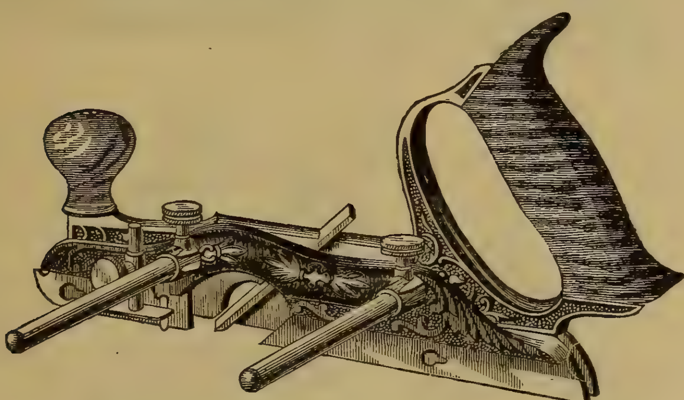


Fig. 34.—Patent Adjustable Dado, Fillester, Plow, &c.

bottom or face level with that of the main stock. It can be used as a dado of any required width by inserting the bit into the main stock, and bringing the sliding section snugly up to edge of the bit. The two spurs, one on each section of the

plane, will thus be brought exactly in front of the edges of the bit. The gauge on the sliding section will regulate the depth to which the tool will cut. By attaching a guard plate (which accompanies the plane) to the sliding section, the tool may be readily converted into a plow, a fillester, or a matching plane.

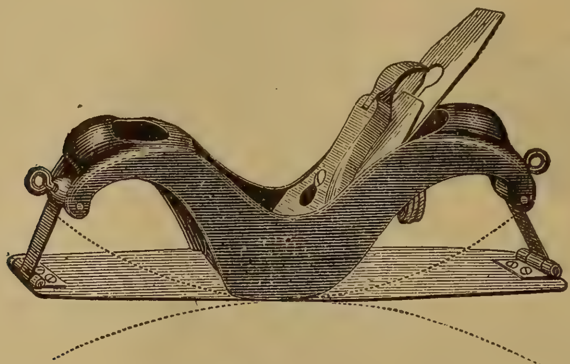


Fig. 35.—Patent Adjustable Circular Plane.

PATENT ADJUSTABLE CIRCULAR PLANE.—This plane, fig. 35, has a flexible steel face, and by means of the thumbscrews at each end of the stock, can be easily adapted to plane circular work, either concave or convex.

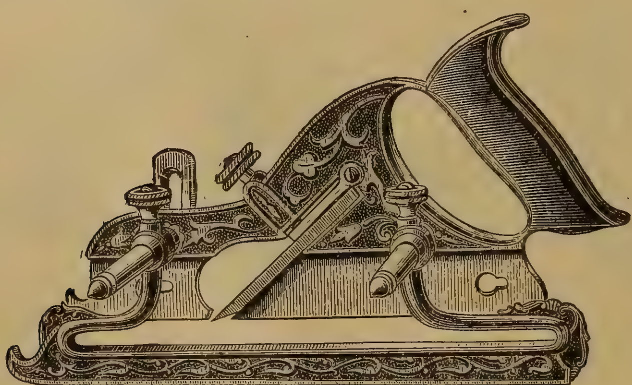


Fig. 36.—Patent Combined Plow, Fillester and Matching Plane.

PATENT COMBINED PLOW, FILLESTER, AND MATCHING PLANE.—The tool which we show in fig. 36 embraces a combination of

the common carpenters' plow, an adjustable fillester, and a perfect matching plane. The entire assortment, it is claimed, can be kept in smaller space, or made more portable than an ordinary carpenters' plow. Our engraving represents the stock of the tool adjusted for use as a plow. A metallic bed-piece, with 1½ inch cutter in it, can be attached to the stock of the tool by means of two screws passing through the slots in the base-piece of the stock. Over this bed piece the gauge or fence will move backward or forward, and when secured to the bars by the thumb-screw, will constitute an adjustable fillester of any width required by the operator. The upright gauge on the back of the stock is adjusted by a thumb-screw, which regulates the depth for the use of the fillester, as for all the other tools embraced in the combination.

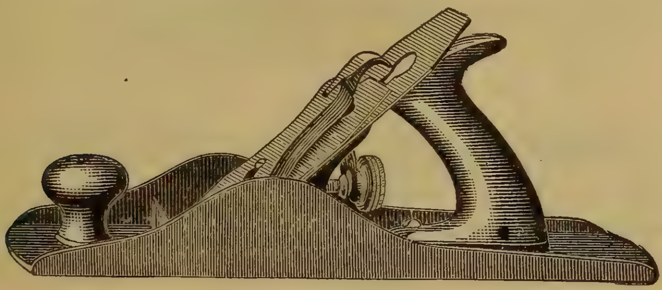


Fig. 37.—Iron Jack Plane.

IRON PLANES are being introduced, and the manufacturers claim that they are favorably received and having large sale. We show a sample, a jack plane, of this manufacture in fig. 37. Fore planes, jointers, and the other varieties are also made. The advantages claimed for them are, beauty of style and finish, great convenience in operating, economy in use, and the fact that they are self-adjusting in every respect, and each part interchangeable.

The trays of the tool chest contain a variety of articles; the plow irons and bits for the stock are kept there; also the chisels, of several of which we will speak.

Fig. 38.—Socket Framing Chisel.

The Socket Framing Chisel, for cutting mortises in heavy house framing timber, has a heavy blade; the handle is set in a socket, and there is an iron ferrule or guard on the end to prevent the handle from being split by heavy blows. They are made of various widths, from ¼ to 3 inches.

Fig. 39.—Socket Firmer Chisel.

The Socket Firmer Chisel has the handle set in a socket like the framing chisel, but has a lighter blade; this chisel is used with the mallet

Fig. 40.—Shouldered Firmer Chisel.

The Shouldered Firmer Chisel is one of the most useful in shop work and house finishing; it is set in a handle, and used by pressure of the hand. They are sold in assorted sizes of from ¼ to 2 inches in width of blade. There is also the paring chisel, a long, thin slim chisel for nice shop work.

Fig. 41.—English Duck Bill.

The English Duck Bill (mortise chisel) is designed for mortising framed work, but is little used now, as a good mortising machine, worked by the foot, costs but $20, and does the work so much quicker and better that it soon pays for itself where there is much framed work to do.

Fig. 42.—Gouge.

The Gouge is a curved chisel, shown in fig. 42. In figs. 40, 41, and 42, we have shown the tools without handles as they

come from the store; care must be taken in putting on the handles to have them straight.

The Screwdriver is too well known to need description; it is an indispensable tool to the carpenter.

The Dividers are often needed in the shop and in the building for laying off work, and also for *scribing*, which is drawing a line on the surface of a piece of stuff parallel to an irregular surface. It is done by the open compasses—allowing one leg of the dividers to follow the surface, while the point on the other leg can thus scratch on the board a representation of the uneven surface with all its ups and downs. If this drawing of the ups and down is then cut away the line left should fit close to the uneven surface. *Scribing* is much practiced in good housework, where tight joints are required on uneven surfaces. It is an advantage to have the dividers provided with a set screw which holds the points at the same exact distance from each other.

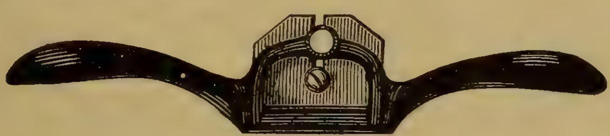


Fig. 43.—*Spoke Shave.*

Spoke Shaves are of wood or iron. We show an iron one in our drawing, with set screw. Spoke shaves are used for trimming round curved edges.

Fig. 44.—*Hatchet.*

The Hatchet is a very useful tool to the carpenter, more especially about a building in the framing work and the shingling.

THE CARPENTER'S SHOP.

We have now enumerated the usual tools found in the tool chest; with them most of the ordinary work done by the carpenter and joiner can be done. We will now look about the shop, and the first thing we notice is the work bench; it is one of the most important of the implements in shop work. It will accommodate two workmen, and has a bench screw at each end, as shown in fig. 45. It is furnished with a vertical

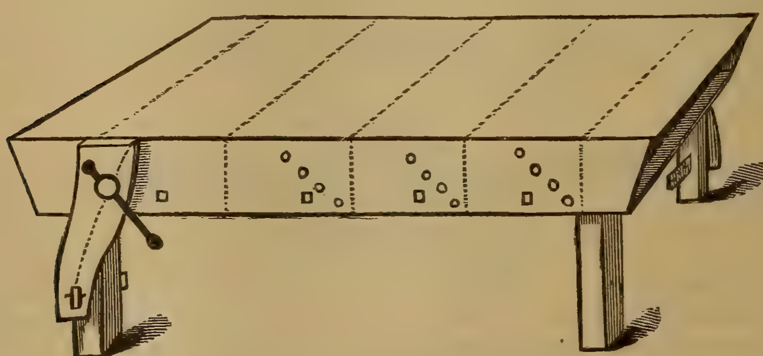


Fig. 45.—*Carpenter's Bench.*

side board, in which are bored vertical ranges of holes to receive the bench pin, whose use is to support one end of a piece of stuff on edge, while the other end is firmly held by the jaw of the bench screw. It will be better understood by a reference to our drawing. The bench is 12 feet long and 3 feet wide; the side board is 18 inches wide, and the center of the screw, the bottom of the jaw, and the upper inside corner should be on a line as shown by the dotted line on the drawing, then the jaw will hold narrow pieces of work tight; they cannot "wobble," which will be found a great advantage in sawing tenons on narrow rails, and other work. The jaw should be made of a piece of well seasoned 2 inch stuff; screws are of wood or iron; if of the former they need to be oiled at first, and afterward well rubbed with a piece of brown soap.

The dotted lines across the bench show where the bearers are put in. The legs should be of 4 × 4 scantling ; the top of $1\frac{1}{4}$ in. thick, tongued and grooved plank ; the sides and bearers of inch plank, all dressed off and well nailed. It will be found handy to have a "stow all" for small tools under the ends of the bench, where they may be laid away when not in actual use, as they are often inconveniently in the way on top of the bench when you have a large piece of work here, and are apt to be lost in the shavings if laid under the bench.

At the top of the bench, near the edge about the bench screw, is the bench stop ; generally an old plane iron with the edge filed like saw teeth and screwed to the top, so that it can be raised or lowered. The object of this is to prevent the stuff from sliding off the bench when being planed up, while the other end is held tight by the bench knife, a piece of steel blade driven into top of bench and into the end of the stuff. The bench planes when not in use stand in a row at the end of the bench near the bench screw, the edges of the irons being protected from touching the top of the bench by a thin strip of wood.

If we are cramped for room in the shop it will be found very handy to have slides in the bench $1\frac{1}{4}$ thick and 4 inches wide on edge, and as long as the bench is wide, two at each end as shown on our drawing, boxed in all round under the bench, and with holes inside so that they can be pushed out on either side ; then, if we have a little ripping to do we can lift the stuff from top of bench and saw a line without loss of time, by the aid of these slides.

If we have no slides in our work bench we will require a couple of saw benches ; and, indeed, when we go out to work about a building, we will require saw benches any way, as slides are only of use in shop work. A saw bench should be about 20 inches high and about 3 feet long. The top is made 2 × 4 or 4 × 4, from any scantling which can be picked up about any building. A saw bench is represented in figure 46. Saw benches are constantly in use about a building, not only for sawing, but the sills, joists, scantlings,

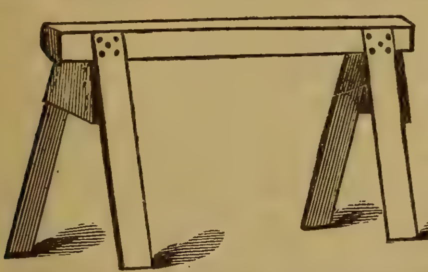


Fig. 46.—*Carpenter's Saw Bench.*

&c., are laid on them to be marked and cut. The saw benches also frequently answer in the building for a temporary work bench, with a plank or two laid upon them.

THE GRINDSTONE. — The grindstone is hung on a strong mortised and tenoned frame, with irons like these shown in fig. 57. The best stones are the Berea, which are quarried in Ohio; they are sold by the pound. There is always a mortise through the center of the stone through which the iron crank is passed, and hard wood wedges are then made to fill in the space all round between the crank and the sides of the mortise in the stone, to test the hang of it. Before you drive the wedges up tight set it in the rollers and turn it, holding some object such as the end of a small stick of wood against the stone on the edge; also against the side, regulating the wedges until the stone touches truly all round one turn. Make all tight and bring up the flanges against the stone. Place on rollers and the stone is ready for use. Be careful in grinding narrow irons on the stone not to wear hollows on the surface, but by changing from side to side you will be able to keep an even surface.

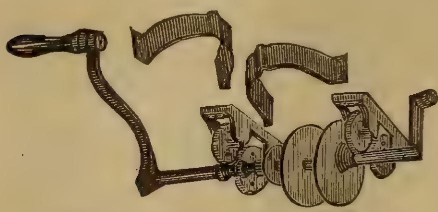


Fig. 47.—Grind Stone Irons.

THE HAND SCREW. — This is a very handy tool about the shop, and is used for holding small pieces of wood together after being glued, and for various other purposes.

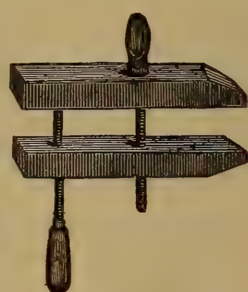


Fig. 48.—Hand Screw.

THE DOOR CLAMP is used for putting together pieces of framed work; doors are put into this, glued and screwed up tight; then the wedges dipped in glue are driven in along side of the tenons, making it all fast. We show a door clamp in fig. 49, on page 33.

THE GLUE POT is a double metal pot, generally iron, the outer pot being filled with water while the inner one contains the glue, which is thereby saved from burning. Glue should be soaked over-night with just enough water to soften it, and it is better that only as much be made at a time as can be used in 24 hours or thereabout.

THE MITER BOX is used for cutting a piece of stuff to a miter or an angle of 45 degrees with one of its sides. It is made as shown in fig. 50, which is on a scale of about $\frac{1}{16}$ of

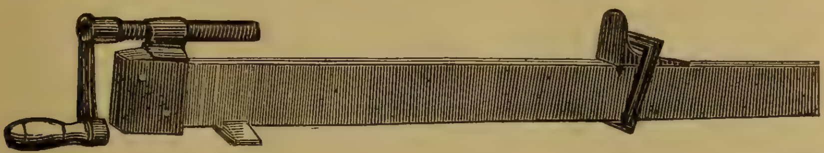


Fig. 49.—*Door Clamp.*

an inch to 1 inch. The bottom is of 2 inch plank, the sides of one inch, all planed up of even thickness, and straight and square on the edges. To make the lines for the cuts we square across the steel square from the point A to B, making a small mark with the knife at B ; then set off the width of the box, which in this instance is 5 inches, toward C ; now a line from A to C is a square miter or angle of 45 degrees.

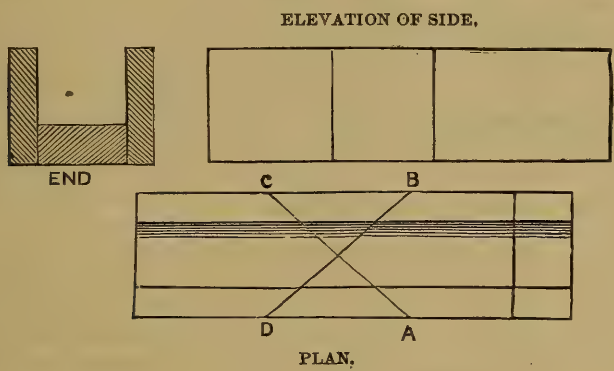


Fig. 50.—*The Carpenter's Mitev Box.*

Make with a knife square marks on the sides of the box from A and C, and with a sharp back saw cut these marks exactly. Proceed in the same way for the cut D B. A square cut at one end of the box should also be made. The box is now ready for use, and if it has been made exactly will make tight miters. The back saw runs in the saw cuts which it made at first.

THE USE OF TOOLS.

HAVING described the tools of the carpenter, we will now refer to the ordinary operations which he performs with them, namely, sawing, planing, dovetailing, mortising, and scribing.

DOVETAILS.

The manner of making dovetails is shown in fig. 51, which is the common dovetail joint, and is the strongest; in it the dovetails show on both sides. There is the lapped dovetail, in which the dovetails show on only one side; drawer fronts are lap-dovetailed to the sides. There is also the lapped and mitered dovetail, in which the dovetail is not seen at all, used for neat boxes, but not a strong joint. As making a dovetailed box will probably be one of the first neat jobs which the novice will attempt, it is well to describe it particularly.

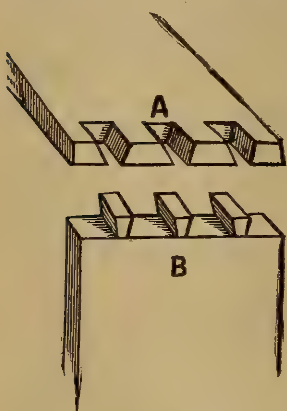


Fig. 51.—*Dovetail.*

We first prepare our sides and ends. We will get them out in one long piece and cut them off afterward. If the piece of board has never been planed, we are of course to take off the "rough" with the jack plane, and then bring down straight and "out of wind" with the fore plane. Then turn on the edge and put into the bench screw, the other end supported on the bench pin, and joint the edge straight and square.

Lay the board on the bench again and mark with the gauge the width—that is, the depth of your box;—mark the edge from which you run the gauge with a lead-pencil cross. Always remember in dressed work to gauge and square from the same edge every time, and that edge or square should always be marked when you first use it. Now put the board in the bench screw as before, and plane off down to the gauge mark, taking care to make the edge square; of course it cannot but be straight if your marked edge be true. Our board has now

one side and two edges dressed off. We now take the thickness gauge, and setting it at the desired thickness, run the gauge from the dressed side along the edges and across the ends, and laying the board on top of the bench, plane down to the gauge mark ; our stuff is then ready to cut up. Suppose our board to be ½ inch thick, and 8 inches wide, and that we want to make a box 7 in. wide and 10 in. long inside ; from the marked edge with the knife square across the face of the board at the end ; then with the rule set off 11 inches, which allows one inch for the two thicknesses of the ends, and gives 10 inches clear inside ; square across the face of the board, and make another square mark about ⅛ inch further on ; then from this mark off another 11 inches ; then, leaving spaces of ⅛ inch between, mark off two 8 inch lengths ; do all marking for saw cuts on particular work with a sharp pocket knife. Now, with a fine cross-cut saw cut off the sides and ends, cutting through exactly square in the spaces we left between the cuts ; when the sides and ends are cut, square the sawed ends carefully, placing them in the bench screw, and planing them true with the sharp smoothing plane, set very fine, and test them with the try square ; then with the thickness gauge, set as it was at first, mark all round each end of side and end pieces, sides as well as across edge. Now place one of the ends, the piece A, in the bench screw, and with the knife mark off the dovetails, taking care to have them uniform in size and distance apart, and not too flaring, as the corners are apt to break off in that case when they are driven together. Square down to the guage mark with the try square, marking with the knife, and saw down these marks carefully with the back saw ; do the same with the four corners of the ends.

Now lay down the sides and ends on the bench, like fig. 52, the marked edges all outward, and mark the corners that are to go together with the same figures. Then mark out the dovetails by the pins, by placing the pins on the side to which they are finally to be attached, with the inside of the pins on the gauge mark, and marking out shape of pins with an old file ground to a point, or any other marker. This will be understood by looking at the drawing, fig. 52. Supposing the holes to admit the pins had not been cut in the piece A, we would

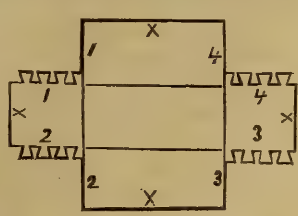


Fig. 52.—Marked Board.

place the pins in B against the end of A, mark cut their form, cut the marks down to the gauge line, which is as we have seen the length of the pins—for did we not at the first mark all the ends with the same gauge ?—then, when with a fine chisel we have carefully cut out the spaces in A, as shown, the pins of B will exactly fit in between the dovetails of A.

When all the corners are cut we put glue on the pins and drive the box together ; and if all the cutting has been done true and square, we shall have a neat job, and after it has stood an hour or two for the glue to set, we can put in the bottom, clean off the glue by planing the outside, hang the lid, &c.

TO MAKE A DOOR.

We will now describe the making of a door, and as that includes the making of mortises and tenons, plowing, &c., this description will answer for an explanation of these operations. When we go to measure any opening for a piece of work, it is better to take a planed strip, say of 1 in. square, by which we will get the hight and width of any space exactly; for remem-

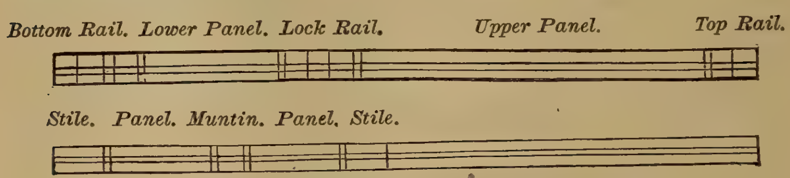


Fig. 53.—*The Rod Laid Off.*

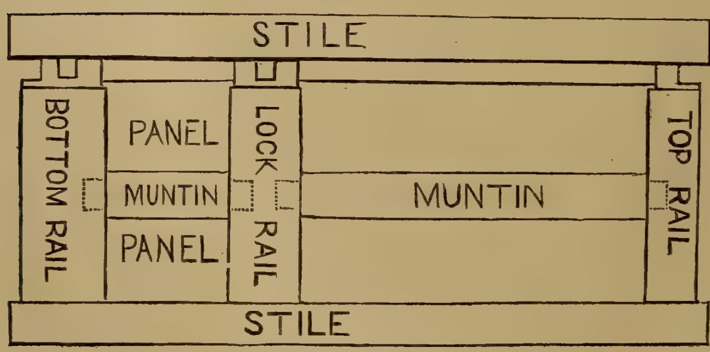


Fig. 54.—*The Door Ready to Drive Together.*

ber, mistakes of figures are always possible in measuring a large space with a two foot rule.

We find our space is 3 ft. wide and 8 ft. high. The first thing to do is to lay off the rod, which we do on the bench; the same rod with which we took the measure will do. In fig. 53 we show the rod laid off. That it may be better understood we have placed directly under the rod the door all ready to drive together with the name of the different parts on it.

The upper rod is the rod for the hight; this we know is 8 ft.; we mark off from the bottom the width of the bottom rail 9 inches. The top of the lock rail is 2 ft. 10 in. from the floor. We set off that distance from lower end of rod, and from it set off the width of the lock rail toward the floor; then from the top set down width of top rail 5 inches. The other marks inside the others are the depth of the plowing for the panels which is shown in the section, fig. 55, page 38. The single marks across the rails indicate the width of the tenons and mortises; for wide pieces of wood like the lock and bottom rails, there should be a double mortise and tenon, as shown in fig. 56, page 39.

The width of the door, 3 ft., is laid out on one end of the rod, as shown under the drawing of the hight rod. We hope these rods will be understood, as the door itself is just below the hight rod, and the parts corresponding are marked. Measure the door and rod for yourself; each thirty-second of an inch represents about an inch; the grooves plowed in the stiles and rails to hold the panels are ½ in. wide and ⅜ in. deep. Be careful always to lay down the depth of your plowing on the rod, the exact position of the mortises depending on the length and width of panels. Always be sure you are right in lengths and width before you cut out your stuff. *Lay out all framed work on a rod* the first thing.

Having got everything right on the rod, we take the cross cut and rip saw, square and chalk line, together with the rod, to the plank pile, and selecting a good 1¾ in. plank cut out two pieces for stiles, 8 ft. 4 in. long, and 5¼ in. wide; one piece of same width, 3 ft. 1 in. long; one 8¼ wide, and one 9¼ wide, both 3 ft. 1 in. long, for top, bottom and lock rails; also pieces for muntins, taking care to saw square and straight, or we will find when we have planed one edge straight, perhaps the piece will not hold out the width. Now pick out a good ½ in. piece of stuff for the panels 11½ wide, two of them 18 in. long, two of them 4 ft. 10 in. long. This

is all the material we require. To dress it up, plane off one side of the stile true and out of wind, and straighten one edge, making it perfectly square ; now set two gauges, one at $1\frac{3}{4}$ in. for the thickness, the other at 5 inches for the width of stiles, muntins and top rail, and dress up the stiles, rails and muntins, according to widths given on the rod, taking care to mark the first face and edge planed up with a lead pencil cross, so that we may know it again. The preparation of panels need hardly be described.

Our door frame is now ready to mark out. Lay the first stile on the bench marked side up, and marked edge toward

Fig. 55.—*Section of Door.*

you ; place the other stile on it marked face down, marked edge toward you ; now lay the rod on top of them in such a position that the mark on each end shall be within the end of stile about an inch, and with the try or steel square carefully mark down the marks on the rod. The muntins you will see the length of on the rod, and mark it on them by placing the rod on each ; the rails of course will be marked by the laying out of width of floor on the other edge of rod ; where mortises go clear through, as in stiles, mark square across face of stile, and down on edge to find out where the mortise comes through and allow $\frac{1}{4}$ in. at each end for width of wedge.

Our frame is now dressed and marked and is ready to mortise and tenon. Set the head of the mortise gauge so that the point nearest the end shall be $1\frac{1}{8}$ inches from it and screw fast. By screw at end open out distance between points till they are half an inch apart, which is to be the width of our mortise, the thickness of our tenon. It is best to set the width by the mortise chisel putting it between the points, as chisels often vary a little in size. Mark with the mortise chisel the stiles and rails at the mortise marks on both sides, always marking from marked edge, as shown in fig. 56. Mark across ends of all rails and muntins, and as far down on the edges as the double marks.

If we have no mortising machine in the shop we must make the mortises with our half inch English duck bill, shown in fig. 41, mortising carefully half way through from each side, holding chisel square so that the hole from both edges may

meet exactly in the center of the stile, the manner of making the mortises will be understood from fig. 56. To form the tenons put the rails or tenon in the bench screw, end sticking up at a convenient hight and rip down on the outside of mortise gauge marks but touching them. In this ripping of tenons we will find out how important it is to hold our rip saw

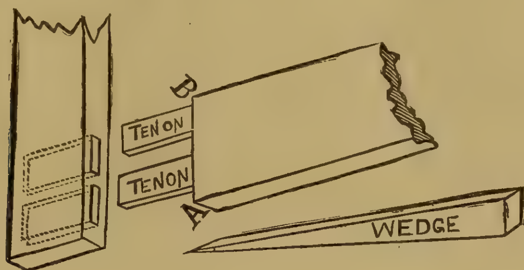


Fig. 56.—*Mortises, Tenons and Wedge.*

in the right way; keep exactly in the line both edges, and saw down true. A tenon should fit a mortise snugly, but yet not fill it so tightly as to require hard driving to send it up. Our mortises and tenons being all cut, we next plow the edges of the stiles, rails and muntins to receive the panels. Suppose we commence with a stile; we will only have to plow one edge of that, while both edges of the lock, rail and muntins have to be planed. Put the stile in the bench screw, one end supported on the bench pin, the other end firmly held in the bench screw, the marked face toward you, the marked edge up. Put the half inch iron in the plow; set it so that the fence is ½ inch from the iron, and set the stop by the top screw, so that it is ⅜ in. above the edge of the iron, Plow carefully, holding the plow square and true. When we have the stiles, rails and muntins plowed, we can cut the shoulders of tenons. The line A B, in fig. 56, is the shoulder of a tenon. We cut them with a sharp back saw, as they lie on top of the bench. The space between the bottom of the tenon and the bottom edge of the rail is called the relish; the wedges, as shown in fig. 56, are generally cut from the relishes of the different rails. When the shoulders are cut, the plowing done, the mortises cleaned out, and the tenons have the relishes cut, the door is ready to put together. Put in the panels, and lay it in the door clamps, fig. 49. page 33; two

of them will do, laid across top of bench. Let the clamps be an inch or two inside of the top and bottom rails; protect the outside edges of the stiles from injury by pieces of wood between the edge and the clamp, as they would be otherwise bruised. Before screwing the door up in the clamps, while the tenons all round are still two or three inches out of the mortices, brush across each tenon, on both sides, a little glue; drive up the stiles with the mallet, protecting the stile from bruising by a piece of wood held against it, getting the door into the clamps and screwod up as soon as possible; for the glue, especially in cold weather, sets very soon, and then it is hard to clamp up to a tight joint. When you are gluing up a door, your partner on the other side of the bench generally helps you, as the clamps and door occupy the whole of the top of the bench, and as he can glue the tenons on one side before the door is clamped up, that operation only takes half the time.

Now that our door is in the clamps and the shoulders all right, we want to keep them so, and dipping wedges in glue, we drive one in each edge of the tenon, which, as the glue sets, makes it impossible for the tenon to be withdrawn. The door may now be taken from the clamps, the ends of the wedges and tenons sawed off, and (pouring a drop or two of oil in the face of the smooth plane to prevent the glue, if still damp, from sticking to the plane) the door may be "cleaned off," and the moldings cut in. To do this we use the miter box, marking the moldings by laying them right on the door, and making little nicks in their back edge with a knife; then by placing those nicks carefully beside the saw-cuts on one side of the box, holding the molding snugly against that side and sawing them there we will get pieces of the right length and have tight miters.

Our door is now made and is ready to be fitted in the opening, and hung with bits. A good workman used to make such a door in a day, but doors are made so much more cheaply by the steam shops than they can be by hand, that doors of regular sizes are now hardly ever made in the ordinary shops; still, the above description of door making will be applicable to all sorts of framed work.

To avoid mistakes in the first attempts at framed work always remember that you must mark the side and edge first planed and jointed, always square, and run the gauge from that side and edge.

JOINTING.

The joints commonly made by the carpenter are the square joint; the matched or tongued and grooved joint; the slip tongue joint, and the rebated joint, The square joint is used

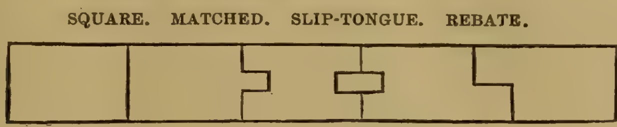


Fig. 57.—*The Various Kinds of Joints.*

for glue joints, and if made in seasoned stuff and kept dry is very strong.

A common sample of the matched or tongued and grooved joint is given in flooring. In ceiling boards and wainscoating it is usual to run a small bead on the joint, as shown on lower side; that is, in the tongue edge; the object of this is, that if the boards shrink slightly, a small opening may not be much noticed. This joint is worked with the matched planes which must be held square to obtain a tight joint on both sides.

The slip tongue joint is generally used for thick stuff, both edges are plowed, and a thin strip fills the space and holds the pieces together.

The rebated joint is rarely used for fastening stuff together, but is employed on the meeting joint in double doors. Closets and folding doors offer familiar illustrations of this joint.

SCRIBING.

This operation is clearly shown in our sketch, fig. 58, It is performed by means of the compasses which (the stuff to be scribed being conveniently fastened) are opened to the great-

Fig. 58.—*Scribing.*

est distance between the edge of the stuff, and the irregular surface it is intended to fit ; then the compasses are drawn along over the irregular surface, and while one point touches that surface all the way along, the other point describes on the stuff an exact profile of the irregular surface. If this is carefully cut away the stuff will fit tight over that surface.

When a number of boards are secured together by cross pieces or ledges screwed or nailed on, they are said to be battened, as the door in fig. 59. To make a door like this is easy. Take such a number of planks or boards, of right length, as will make a door of the width you want. Floor planks with tongue and groove on are good, and if you want to make a fair door you should plane off the back side and run a ¼ in. bead on the joints, (as shown on the joint, fig. 57,) on both sides of the plank.

Fig. 59.—*Battens.*

Always remember when running a bead on anything, to take off the outer corner with the small hollow. If you have door clamps you can put your batten door together with them on the bench, if not the floor will answer ; tack down on the floor, at a distance an inch or two further apart than the width of the door, two strips and lay the boards for the door between them, driving them up, outside face down, the ends square with each other ; tighten up the whole with wedges driven in between the strip on one side and the door ; then nail or screw on the battens, and the door is ready to fit and hang.

THE OIL STONE AND ITS USE.—The best stone comes from Hot Springs County, Arkansas, is creamy in color, and for the carpenter's use is sawed up into slabs of about an inch in thickness, 8 inches in length and two in width. We must put our oil stone in a neat box, projecting above the box, with a removable cover to keep off the dust. To use the oil stone we drop a few drops of oil on it from the little oil can, and rub the plane iron, or whatever we desire to sharpen, holding it so that the bevel of the edge may be but slightly less than that given by the grindstone. Of course, after repeated rubbing on the oil stone the bevel is shortened, a thin edge can no longer be rubbed up on the oil stone, and we have to restore the long bevel on the grindstone. The best sort of oil

to use on the oil stone is sperm, although sweet oil and lard oil are nearly as good, but in cold weather they congeal and won't drop from the can. After using, the oil should be carefully wiped from the oil stone, and the lid put on, for the old oil when left on the stone gums and cakes on it, and makes it harder, while a rub off after every using keeps the stone in good cutting order. Oil stones are apt to wear hollow, that is, lower in the center than at the ends. To bring them straight, take a handful of fine white sand and wet it with water on a flat stone, brick or piece of plank, on which rub the stone with the face down, and a little time will bring the surface up straight, and as good as new. An oil stone in ordinary use will not require such treatment more than once or twice a year. Besides the ordinary bench oil stone we find a number of narrow short slips of various thickness and various shaped edges ; these are called slip stones, and are used for sharpening the irons of the beads and molding planes, which can not be reached by the above-described oil stone.

THE RULE.—The carpenter's *two foot rule* is a measure of 24 inches in length, and in four folds of six inches each, almost always made of boxwood, and all the better for being bound with brass, on account of the edges not wearing so soon, and it not being so liable to be broken. We generally carry the rule in our pocket, but as it is heavy and the corners are sharp it is destructive to ordinary pockets, we have a pocket made in the pants just back of the left hip, the width of the rule and 5½ inches deep, so that half an inch projecting from the pocket enables us to easily pull it out. By getting into the habit of returning the rule to the pocket after using we will be saved the loss of a great deal of time in hunting for it. It will be seen that on the outer edges the inches marked on the rule are divided into eighths, while in the inner edges the eighths are divided once more, making sixteen divisions of the inch. On the other side in some rules the inches are divided into ten and twelve parts. This is to enable us to measure architects' drawings of work, as they are often made in such a way that a tenth or a twelfth of an inch on the drawing represents an inch in the work to be prepared.

BUILDERS' HARDWARE.

We will describe some of the ordinary hardware used in house building, which will make clear to the inexperienced reader many of the terms which he may come across in architects' specifications and descriptions of buildings:

Nails are of great variety and size, the most common used about the framing are the tenpenny "big heads," 3 in. long, so called because the head projects over side and edges. In the finishing nail the head projects but little over the edge; these nails are made with such small heads that the head of the nail may be driven below the surface of the wood with the nail set without splitting the wood as the big head would do. This is required in work where the nail holes are to be puttied up and the work to be painted.

Nails were formerly made by hand, and sold by the hundred, the smallest at threepence per 100, and from that price up to six, eight, ten and even fifty pence per hundred. The ordinary kinds are all now cut or stamped out, but the old names of sixpenny and tenpenny still stick to them as handy designations.

The Clout Nail is one which is made of malleable iron (iron deprived of its carbon by a peculiar process, and therefore not like the ordinary cut nail), has a large head projecting all round, and is driven completely through the stuff so that the end of the nail can be turned with the hammer, when it is said to be "clinched." Batten doors are common instances of this style of nailing. The clout nail is also called the "wrought nail," and the "clinch nail," and there may be some slight difference in the shapes of the head. They are all intended as clinching nails.

Brads are made of various sizes, from ⅜ to 2 inches in length, and are used for tacking the moldings in the panels of doors, and nailing up other thin material. Of course they must be driven with flat side parallel to the grain of the wood. They are also called "finishing nails" and "spriggs."

In white pine it is hardly ever necessary, if you know how to drive a nail, to bore a hole for it, as a properly driven nail cannot split the stuff; but in hard wood, as oak, mahogany or walnut, especially if it be dry and well seasoned, there is

great danger, and holes should be carefully bored with the brad iron, or with some of the small bits in the brace.

SCREWS are made of great variety ; the kind most used by the carpenter are the gimlet points of from ½ to 2 in. and more in length. They are distinguished from each other by their length and thickness through the body—that is, the ½ in. screw of one number will be delicate and threadlike, while the ½ in. screw of another number will be stout, with a head almost half an inch across.

Screws are made in the United States by two or three large companies, and as the business is somewhat of a monopoly screws are rather dear ; but the "patent gimlet-point screw," which has been introduced during the last twenty years, is a great improvement over the blunt end screw, for which an exact hole had to be carefully bored with a gimlet ; whereas now the gimlet point draws the screw down itself, and in pine or any soft wood no bored hole is required.

FRAME PULLEYS.—These are the little iron wheels inserted in the upper end of the pulley stile in the window frame, over which runs the cord which holds up the sash weight, an iron weight which runs up and down in a box inside of the frame. The weight ofthe sash is counter balanced by two sash weights, each weighing half as many pounds as the sash itself.

Frames hung with cords, pulleys and weights are said to be box frames, on account of the boxes at the side in which the weights run. When both top and bottom sashes have cords, weights and pulleys, the window sash is said to be double hung.

SASH FASTENERS.—Of these there are a great variety ; similar in this, that one piece is fastened to the bottom rail of the top sash inside of glass, while the other piece fastens to top edge of top rail in lower sash. When the sashes are closed the spring catch can be secured over the plate on the upper sash, and the sash cannot be opened from the outside. Besides the protection which the sash fastener gives from the attempts of small thieves, who are afraid to break a glass or burst in a door, it also prevents that rattling of the sashes in the frames, which is often so disagreeable on a windy night.

We will now look at the various kinds of hinges that the carpenter uses to hang doors, &c.

HINGES.—Fig. 60 shows what is known as a *narrow fast butt;* we see it is narrow, but why fast? Because the two plates of the hinge will not come apart ; they are riveted together. And why a butt ? Because it is put on the edge of the door, or the

part which butts against the casing, and not on the face, as blind hinges and other wrought-iron hinges are in common work sometimes. Fig. 61 is a *loose butt;* we see that the left hand half can be lifted off the right hand. These hinges are said to be *right* and *left;* we see that the hinge below, (fig. 61,) is a right hand hinge; that is, it is only possible to use it on a door *which opens from you to the right.* A little study of this hinge will demonstrate that fact. On this account, unless care be taken we are very liable to make mistakes in ordering our butts, which would, of course, be exceedingly annoying.

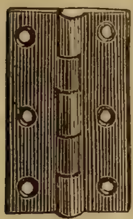


Fig. 60.—*Narrow Fast Butt.*

THE NATIONAL BUTT.—This is a butt which is growing into favor. It has all the advantages of the loose butt, while it

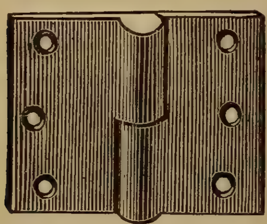


Fig. 61.—*The Loose Butt.*

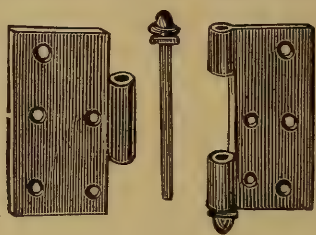


Fig. 62.—*The National Butt.*

can be used for doors of either hand; for it will be seen by looking at it that it matters not which side of the hinge is attached to the door, so that the head of the pin is kept up.

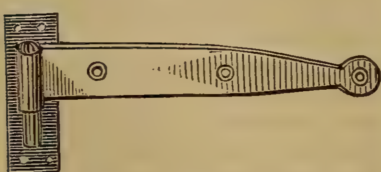


Fig. 63.—*Rolled Plate Hinge.*

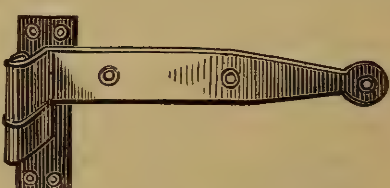
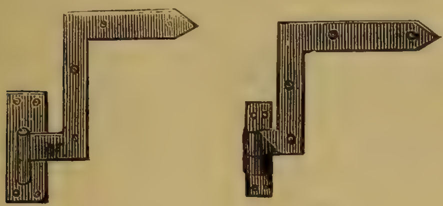


Fig. 64.—*Rolled Raised Hinge.*

There are other butts and hinges of various kinds and names, which it is unnecessary to describe here. We will only show a few of the wrought iron hinges.

Fig. 63 shows the *rolled plate hinge* for heavy doors, such as stables, barns, &c

Fig. 64 shows the *rolled raised hinge;* this is intended for heavy doors which set back below the face of a brick wall. We can see that when this door is opened it will be thrown off, so that it can be opened out flat against the wall. The same idea is shown in these blind hinges, figs. 65 and 66.



Figs. 65 *and* 66.—*Blind Hinges.*

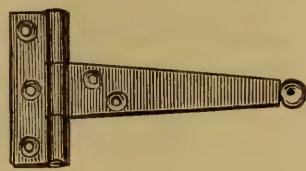


Fig. 67.—*"T" Hinge.*

The one represented in fig. 66 is intended for blinds hung to window frames in brick walls; a look at the next window shutter you see in a brick wall will show you that if the hinge was not raised it could not open round against the brick.

These blind hinges are made to run in the stiles and rails of slat blinds to keep them square. The stiles and rails are so narrow that the mortises and tenons have not much strength, and the hinge is made so as to strengthen them.

Fig. 67 shows the T hinge, so called from its shape.

Fig. 68 represents a strap hinge.

Fig. 68.—*The Strap Hinge.*

The Thumb Latch is familiar to all of us; it is, after the ordinary button, one of the simplest of door fastenings.

Locks.—Of these there are a great variety. That called a rim lock is so named because it is put on the rim of the door. Rim locks are made right and left, that they may be used on doors opening either to the right or left without turning the lock (and keyhole) upside down.

The iron catch in the door casing which holds the lock bolt and latch is called the *nosing.*

A Mortise Lock, as its name implies, is one which is mortised into the thickness of the door. The *furniture* of the lock

are: the *knobs*; the *roses*, which surround the holes through which the knob shaft turns; and the *escutcheon* and *drop*, the former surrounding, the latter covering, the key hole. The furniture is made of a great variety of material—wood, porcelain, brass, bronze, ebony, ivory, glass, &c. The variety of locks now manufactured is almost infinite.

Among bolts we may mention the *barrel bolt*, which is fastened to the door without mortising; the *mortise bolt*, to be inserted in thickness of the door, a plate being let into the door frame to receive bolt; the *flush bolt*, to let into the edge of the door flushwith the surface. It is often used in folding doors and neat double doors in closets, &c.

DRAWING FOR CARPENTERS.

In this part of our little book it has seemed best to say a few words about drawing, as some knowledge of it is absolutely necessary to a good mechanic. The beginner must understand, however, that if he wants to become a thorough draughtsman and architect, he should get some good work on geometry and industriously study it. We propose to give here such instructions as will serve a good workman under ordinary circumstances.

The Drawing Board.—This should be a perfectly square and true board; 1½ in. thick, 23×31 in., is a good size. It should be of well seasoned white pine, and should have no clamps across the ends, because even the best seasoned will swell and shrink with the change from dry to wet weather, and if the clamps project a hair's breadth beyond the edge they throw off the square considerably on the other side of the board. The drawing paper is fastened on to the board either by wetting it and pasting it down at the edges, when it assumes a tight surface when dry, or it is secured at the corners by drawing pins—small brass tacks with large flat, thin heads.

The T Square is of two kinds; one with fixed head, the other with a shifting head. The latter can be used both as a square and bevel. T squares should of course be perfectly *square*; blade 2½ in. wide, and a little over 1-16th thick. The length of course varies; 36 inches is a convenient length.

Drawing Instruments. — The beginner does not want many instruments ; indeed, notwithstanding the large showy boxes offered to you by instrument makers, all you will be likely to want, at least at first, (and if you know how to *use them,* you can make as neat a drawing as any one) are the following : A pair of plain dividers with fine points ; a pair of compasses with fixed needle point, pen, pencil and lengthening bar ; a pair of spring compasses for very small circle.

Pencils.—The No. 4 Faber pencil is a good one for making neat drawings which are to be inked in ; for making working drawings on thick paper, a No. 2 pencil will be better.

Where lines are to be inked in, of course it is desirable to have them as light and delicate as possible ; a little practice and steady hand will secure a proper touch. A pencil need not be held tightly ; a slight hold, without slackness, is what is wanted, inclining a little to the side toward which the line is drawn. In prepartions for a drawing to be inked in, no more lines should be made on the paper than are absolutely necessary to complete it ; they should also be very light.

Circles and arcs should, in general, be inked in before straight lines, as the straight lines can be more easily drawn to join the circles than the circles to join the lines. When a number of circles are to be inked from one center, the smaller should be inked first, while the center is in better condition.

India rubber is the ordinary means of correcting errors in penciling ; where only a slight mistake is to be corrected it is quite suitable, but repeated application of it raises the surface of the paper and imparts a greasiness to it which spoils it for fine drawing, especially if ink shading or coloring is to be applied. It is much better to leave trivial errors in pencil alone, if correction can be made with the pencil alongside without confusion ; as, in such a case, it is enough to clear away superfluous lines when the inking is finished.

For cleaning a drawing, the inside soft part of a piece of bread two days old is preferable to india rubber, as it cleans the surface well and does not injure it.

In drawings intended to be highly finished particular pains should be taken to avoid the necessity for corrections, as everything of this kind detracts from the appearance.

In using the T square, the more convenient way is to draw the lines off the left edge, with the right hand, with the left hand holding the stock steadily but not very tightly against the edge of the board.

To draw lines in ink with the least amount of trouble to himself, the draughtsman ought to take the greater amount of trouble with his tools. If they be well made, and of good stuff originally, they ought to last fifty years. Their working parts should be carefully preserved from injury; they should be kept well set, and above all scrupulously clean. The setting of instruments is a matter of some nicety, for which purpose a small oil stone is convenient. To dress up the tips of the pens, or of the bows (as they are usually worn unequally by the customary usage), they may be screwed up into contact in the first place, and passed along the stone, turning upon the point in a perfectly perpendicular plane, till they acquire a shape exactly alike. Being next unscrewed and examined to ascertain the parts of unequal thickness round the nib, the blades are opened and laid on their backs on the stone, and rubbed at the points till they are brought to an edge of uniform fineness. It is well to screw them together again, and pass them over the stone once or twice more, to bring up any fault; to retouch them also on the outer and inner side of each blade, to remove barbs or frasing; and, finally, to draw them across the palm of the hand.

The China or India ink, which is commonly used for line drawings ought to be rubbed down in water to make the ink just so thick as to run freely from the pen, avoiding the sloppy aspect of light lines in drawing. This medium degree may be judged of after a little practice by the appearance of the ink on the dish. It is well to keep the dish covered by an ordinary piece of window glass, which will prevent its evaporating in a few hours, as it will in summer time. The best ink has a soft feel, free from grit or sediment when wet and rubbed against the teeth, and it has a musky smell. The rubbing of India ink in water tends to crack and break away the surface at the point. This may be prevented by shifting at intervals the position of the stick in the hand while being rubbed, and thus rounding the surface. Nor is it advisable to bear very hard, as the mixture is otherwise more evenly made. The pen should be leveled in the ink to take up a sufficient charge; and to induce the ink to enter the pen freely, the blades should be slightly breathed upon or wet before immersion. After each application of ink, the outsides of the blades should be cleaned, to prevent any deposit of ink on the edge of the square.

To keep the blades of the *inkers* clean is the first duty of a draughtsman who is to make a good piece of work. Pieces

of blotting paper, cotton velvet, wash leather, or even the sleeve of a coat, should always be at hand when a drawing is being inked in. When a small piece of blotting paper is folded twice so as to present a corner, it may be usefully passed between the blades of a pen now and then, as the ink is liable to deposit at the point, and obstruct the passage, particularly in fine lining; and for this purpose the blades must be partially unscrewed to admit the paper. But this process may be delayed by drawing the point of the pen over a piece of velvet, or even over a piece of thick blotting paper; either way clears the point for a time. As soon as any obstruction takes place the pen should be immediately cleaned, as the trouble thus taken will always improve the work. If occasion arises to lay the pen down temporarily with the ink in, it should be unscrewed slightly to keep the points apart and to prevent deposit; and when through with, the pen should be thoroughly cleaned at the nibs, to preserve its edges and prevent rust.

Scale Drawings.—In the erection of buildings of any size it is customary to make scale drawings of the building and of the different parts. These are generally prepared by an architect, but in doing any piece of work it is frequently desirable to make a drawing of it, and a good mechanic should be able to do this readily; in other words he should be a good linear draughtsman. Linear drawing is a practical application of the principles of elementary geometry, and to any young man who wants to know more than the average run of good mechanics, we can give no better advice than to employ the leisure of evenings and other times in posting himself in the knowledge of plane and descriptive geometry, which will be certain to prove valuable. The proper construction of stairs and twisting hand rails involves an acquaintance with the sections of the cylinder. A little determined application will master these things, and their possession will be priceless. The evenings during one year resolutely applied to study will enable you to gain as much of them as is necessary. Of course, in the limits of a small book like this, it will be impossible to do more than give a general idea of such matters, but the beginner at the trade is earnestly advised to study.

As a practical exercise we will now go through all the details of preparing drawings and specifications of a box house, 18 ft. long, 12 ft. wide, and 10 ft. high to the eaves.

When doing any particular work on the bench it is often necessary to make a full size drawing of it, to refer to while the work is going on; but where the object to be represented

is a large one we make what is called a *scale* drawing; that is, on the drawing a certain measure will represent a certain larger one in the real object; for instance, in a drawing of the scale of three-fourths of an inch to the foot, every ¾ of an inch measured by your rule represents 12 inches in reality, and as there are twelve-sixteenths of an inch in ¾ of an inch every sixteenth on the drawing represents an actual inch. This makes the scale of ¾ of an inch a convenient one to make drawings by.

It must be remembered that an architectural drawing is *projected;* it does not look on the paper as it would look in reality. On such drawings every part has its true size which can also be measured by a rule; in reality we all know that a small object near the eye looks much larger than one further off, although the more distant one may be very much larger. To make our meaning plainer we show, in fig. 69, a representation of a block 3 inches long, ½ in. thick, and 1 inch wide. This shows the block as it actually appears held up near the eye; and although this is the real appearance of the block, there is no line on which we could put our rule and obtain the true dimensions by which to make a block like it. To make a drawing which can be worked after, we must represent it with all the lines of the actual size as in the different views given in figs. 70, 71 and 72. By the "front elevation" we learn the width and the hight; the "side elevation" shows the length and hight; the

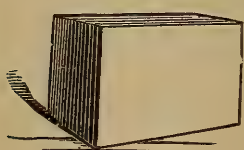


Fig. 69.—*Perspective.*

Fig. 70.—*Side Elevation.*

Fig. 71.—*Front Elevation.*

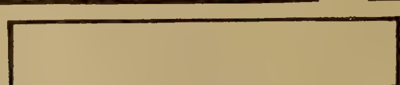


Fig. 72.—*Plan.*

"plan" shows the length and width. This looks to be a very simple thing, but when you can make a front elevation, plan and section of a building, or piece of work correctly, you will be a good linear draughtsman.

The house which we show below is 28 ft. long, 12 ft. wide, and 10 ft. high to eaves from floor inside. It is such a one

Fig. 73.—*Front Elevation.*

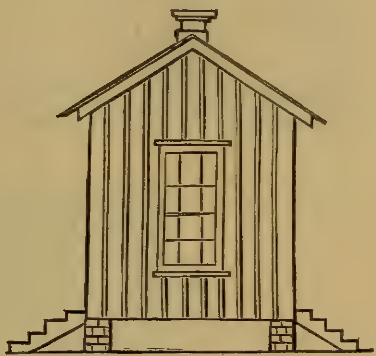


Fig. 74.—*Side Elevation*

as a man could put up himself in a few days with very little help, and without the assistance of the architect. It will answer to live in for a few months, and when we are able to put up a larger house it will answer very well for a kitchen. As our drawing is too small a scale to work from, suppose we lay it out on a smoothly planed board on a scale of ¾ of an inch to 1 foot. It will then take 21 in. to represent this house in length, and 9 in. will represent the width of the building. It is well to make the "plan" on the lower part of our drawing board, and lay off the doors and windows on it first, in their proper places; then they can be easily transferred by the T square to the "elevation" above. In this plan we place a door 3 feet from the front right hand corner, and a window 3 feet from the left hand corner; also a window in the left hand side of the house, and a door and window in the back of the house the same as in front. In drawings, doors, when they are outside ones, are usually represented with the outside line of the house across the door openings, as in our drawing; when the doors are inside ones, in partitions, &c., there should be no line drawn across them. In drawing windows always show a

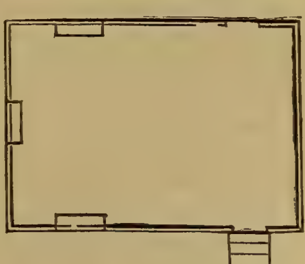


Fig. 75.—*Sketch of Plan.*

double line to represent the sash across the opening, as in this plan.

We show the steps at the front door on our drawing, but not at the back door on plan; they can be seen on side elevation.

We think the operation of making this drawing will be easily understood. Every line in it which is parallel with the edge of the drawing board toward us, is made by lining along

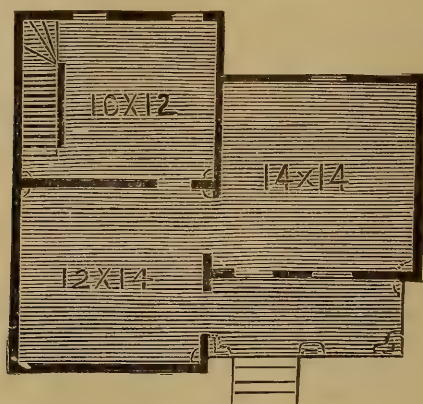


Fig. 76.—Plan of First Story.

the T square blade with the stock pressed against the left hand edge of the drawing board, and of course the lines square with them, are made with the stock of the T square against the nearest edge of the drawing board. In arranging the drawing table have the light come from the left hand; in that case you need not line in the shadow of the T square blade, as you will if light comes from the right.

Having arranged the *plan* of our house we draw a ground line a little above it, and with the T square stock pressed to the lower edge by lining up along the blade we can transfer the positions of the doors, windows and other parts above the ground line, so as to form the elevation. The door is 8 feet high from the floor, and we make the tops of our windows correspond with it; and as they are 12 light windows with 10x16 glass, as the opening for that size glass is 5 ft. 10 in. high, we find it brings the sills 2 ft. 2 in. from the floor.

In our drawing the top of the floor, shown by door sill is 3 ft.

above the ground line, so we make 5 risers to get up there on the front steps; this makes each rise a little less than 7¼ in. If we had only divided this space into 4 parts, we should have had 9 in. in each rise, which would have been too high a rise. From 7 to 8 inches is the proper hight for the risers of stairs; get them as near 7½ as you can. There is yet another consideration in these steps, that is the "run" of them. The run of a step is the actual horizontal distance between the

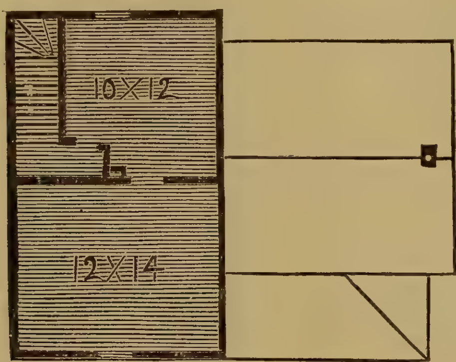


Fig. 77.—Plan of Second Story.

face of one riser and the face of the next, and the *run*, like the *rise*, must be uniform throughout; for you must here take notice that in doing this drawing you are really *building the house on paper*, with this important difference, that whereas experiments and mistakes on the drawing involve only the erasure of a few lines, the same things in the actual building involve costly waste of time and material. So, to lay out our steps, we get our five spaces set off on the elevation between the top of the door sill and the ground line. Ten inches is the proportionate run for this rise. Of course we cannot show it on the front elevation but we can on the plan, and on the *side* elevation. There are five risers in the distance between the ground and the floor, but as we make the door sill answer for one of the steps we only require four of them. Let it be remembered that it is not the width of the step, or tread on top, which makes it right—it is the *run*. No matter how much projection we give to the steps to make them wide, if the proportion of the steps is not about 7½ in. rise to 10 in. run, they will be "hard to go up."

The rise, remember, is the distance from the top of one step to the top of the next. For the practical construction of these steps we will have something further to say a few pages on. It is the drawing which concerns us now.

The chimney is not shown on the plan of this house as it is supposed to be supported by props from the floor. This is not a good way in a durable house, but as it takes only about one-third of the brick, and we are aiming to put up a cheap house, we let it go. It will be $1\frac{1}{2} \times 2\frac{1}{2}$ bricks in size, that is 12×20 in. This gives a flue inside of 4×12 in., which is quite sufficient. It should be smoothly plastered on the inside with mortar, so that if some of the joints in the brickwork should not have been quite filled, the chimney may still be tight, not smoke, and be safe from danger of fire communicating from it to the wood near which it passes. Smoothly plastering the inside of a chimney also improves its draught in any case. At the proper hight inside, what is called a sheet iron thimble, a piece of 6 in. stove pipe, 4 in. long, should be built into the chimney to receive the stove pipe.

The roof is what is called a third pitch; that is, it is a third of the width of the building, higher on the ridge than it is on the sides. To lay it off on the drawing we find the center of the building, and draw a line up through, making another across it at the hight of the room inside, 10 feet. Now, as the building is 12 ft. wide, we set up 4 ft. from the cross line, on the center line, and that hight is the top of the ridge. Then draw lines down to the ridge as shown in fig. 74, giving a projection of 12 inches at the eaves. On measuring the rafters, we find them to be 8 ft. 6 in. long; we could have arranged to make them 8 ft. only, by making the roof of a quarter pitch; that is, only 3 ft. rise in the center line, but a third pitch is best.

The walls of the house are supposed to be of inch boards, 12 in. wide, with 3 in. strips nailed over the joints; and the house is on brick piers, although, if brick cannot be had, good heavy blocks sawed off a tree trunk will answer; while the chimney may be of stove pipe, passing through the roof in a double tin collar.

The windows, of which there are three, are of 10×16 glass, 12 lights to the window, common frames; that is, not hung, with only the bottom sash movable, and when that is opened it must be propped up by a stick or secured by a button.

The doors are 3×8; they are represented in the drawing as four panel doors, but they will cost us about four dollars

each for the doors alone. We can, by following directions on page 42, make a fair batten door to fill the opening, and make a neat appearance.

SPECIFICATIONS.

We will now give the "specification" for this house. In the specification all the work should be minutely described in regard to workmanship and material, while for size, &c., the drawings are referred to, but they may be considered as part of the specifications. The importance of full and proper specifications can hardly be over-estimated when work of any magnitude is to be performed. They prevent all dispute and misunderstanding between owner and contractor, and are a mutual protection to them.

Specification of the materials to be furnished and the labor to be performed, in the erection and completion of one story frame house to be built at ——, in the town of——, for Mr. ——, according to the accompanying drawings which have been prepared therefor by Mr. ——.

DIMENSIONS.

The building will have a frontage of 18 ft., by a width of 12 ft., and will be 10 ft. high in the inside, from the top of the floor to the top of the plate. For the positions of doors, windows and steps, reference is made to the drawings.

FOUNDATIONS.

The sills will rest on brick piers, $1\frac{1}{2} \times 2\frac{1}{2}$ bricks in size; there will be three piers on each side as shown on the elevation, six piers in all; one at each corner and one between corners. Piers will be started 8 in. below the surface, on a footing 2 bricks high, $2\frac{1}{2} \times 3\frac{1}{2}$ bricks in size. They will be carried up 2 ft. above the highest ground over which the house stands.

Chimney flue will be carried up on studding props, 5 ft. high from the floor inside; it will be $1\frac{1}{2} \times 2\frac{1}{2}$ bricks in size, and the flue in the inside must be smoothly plastered with mortar. There will be an iron thimble of $6\frac{1}{2}$ in. diameter, inserted in the flue at the hight of 8 ft. from the floor to re-

ceive the stove pipe. Chimney is to be neatly topped out above the roof, as shown on the drawing.

TIMBER.

All the timber used throughout is to be of sound quality, and as well seasoned as can be procured; it will be of the following dimensions: sills, 6 × 6; floor joists, 2 × 8, placed 18 in. from centers; the ceiling joists and roof rafters will be 2 × 4, placed 2 ft. from centers.

ROOF AND COVERING.

The roof will be sheathed with 1 in. boards well nailed to the rafters, and these with the best quality of shingles, laid 5 in. to the weather, with the joints well broken. The eaves and gables will be finished with plain 4 in. strip, nailed to ends of rafters. The projection over wall will be 12 inches.

SIDING.

The house will be inclosed with sound 1 in. boards, 12 in. wide, with ⅝ in. strips, 3 in. wide, nailed over the joints.

FLOORS.

The floors will be laid with a good quality of mill worked flooring, well seasoned and laid in courses, blind nailed to each joist.

WINDOWS.

The windows will have common frames, with 1⅜ in. sash, 10 × 16 glass, 12 lights to the window; outside casing 4 in. wide, lower sash movable. There will be a wooden stop on frame to hold up the sash.

DOORS.

The front and back doors will be made as shown on the drawing, in 4 panels, with O. G. molding on stile and rail; doors 1⅜ in thick. Doors will be hung with 4 in. "national butts," and secured by 5 in. rim locks. There will be a 5 in. barrel bolt on each door.

STEPS.

Front and back steps will be put up, shown on drawings, on 2 in. strings, with 1¼ treads; and,

FINALLY,

If there is anything mentioned in these specifications which is not shown in the drawings, or if there be anything omitted in these specifications which is shown in the drawing, the same is to be done by the contractor without extra charge.

For form of Contract see page 85.

Now that we have our drawings and specifications, we make out our bill of materials necessary for the building, and commencing at the foundations we figure out the number of brick we will require, by calculating to lay the piers on footing courses as specified, and to start the chimney flue 5 ft. from the floor. We find that it will take about 1,000 bricks. Each pier contains 108 bricks if started 8 in. below the surface and carried up 2 ft. above ground, of the size given. There will be about 11 ft. of chimney measured from where it starts to the top; this will require 350 bricks. These calculations you can make for yourself, in this way: for instance, let fig. 78 represent the pier, $1\frac{1}{2} \times 2\frac{1}{2}$ bricks in size; you see it will take 8 bricks for every layer. It takes 6 layers of brick, including joints, to rise 17 inches in hight where this book is written, but sizes of brick vary in different localities. You can easily measure a piece of brick work, to find out how many layers it will take to give the required hight. You find the number of brick in the footings and the chimneys in the same way. It is customary to allow the chimney as solid, as a good many bricks are broken in handling, and the topping out of the chimney requires a few extra ones.

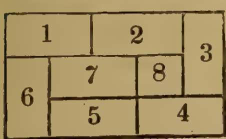


Fig. 78.—*The Pier.*

To lay this number of brick you will require 20 cubic feet or 16 bushels of sand, and 4 cubic feet or $3\frac{1}{5}$ bushels of quicklime. The mortar should not be mixed on the ground, but upon a rough board floor.

If you lay your own brick, as, perhaps, you may have to do, be careful to have them level the courses plump over each other, square and straight.

We now figure out our lumber bill. We shall require two sills 6×6, 18 ft. long, for the sides of the house, and two 6×6, 12 ft. long for the ends. Our floor joists, we see by the specifications, are placed 18 in. from center to center; they run across the 12 ft. way; therefore we see there are 12 spaces of 18 in. each, for which 13 joists will be required, 2×8 and 12 ft. long.

The plates are the pieces on which the lower ends of the roof rafters rest; they also serve to fasten our siding to. In this house we shall want two 2×4, 18 ft. long, and two 2×4, 12 ft. long; and it is best to have a 2×4 stud on each side of door and window openings. As there are two doors and three windows we will require ten 2×4, 10 ft. long. Add two more for the chimney props, two 2×4, 10 ft. long.

On measuring the drawing we find that the roof rafters are 8 ft. 6 in. long, allowing them a foot projection. The most economical way to get them will be in 18 ft. lengths, as steam mills only cut the even feet, and instead of getting 2 pieces, each 10 ft. long, as we would otherwise have to, we will get one piece, 18 ft. long, from which we can get the two 8 ft. 6 in. pieces. On reckoning up we find we will require 12 of these, as they are to be placed 2 ft. apart, and also 8 ceiling joists, 12 ft. long, 2×4.

The roof, we find by measuring the drawing on the front, is 20 ft. long; and by measuring on side, we see it is nearly 9 ft. down one side, making a surface 18×20. By multiplying these measurements together we find it will take 360 feet of sheathing boards to cover the roof. For the edges of gable and eaves we will also want 4 in. wide strip, as mentioned in the specifications; it will take 76 feet of this.

There are 360 square feet of surface in the roof. As carpenters reckon 100 square feet one "square," we find there are 3⅗ squares of roof to cover with shingles. The reckoning of the number of shingles necessary to cover a roof varies in different parts of the country; where we write it takes 800 sawed shingles to cover a square of roof; reckoning on this basis we find our roof will require 2,880 shingles to cover it.

We shall require for our siding 60 boards, of which 54 should be 12 ft. long, the balance 16 ft. long. For the gable end of house of the strips to cover the joints we can reckon up the quantity as 64.

The flooring is required to cover a surface of 12×18 ft.; this will take 216 ft., but as it is customary at the mills to count the flooring at 1¼ in. thick, we have to add 58 ft. to this quantity, making 274 feet; then, if it is worked, that is tongued and grooved, 50 per cent. is added to that quantity, making 411 feet that we must order at the mill to cover 216 ft. of flooring. Before ordering flooring it will be well to find out how the mills in your neighborhood figure it.

For front and back steps we will require two 1¼ in. plank, 18 ft. long, 11 in. wide. For stringers of same we will order two 2 in. plank, 12 in. wide and 10 ft. long.

For our window and door frames,—if we cannot get them at the mill as cheap as we can make them,—we will order for the doors, 4 pieces 2×4, 12 ft. long; for the windows, 3 pieces 2×4, 16 ft. long; and 2 pieces 12 ft. long, 2×6, for sills of both doors and windows.

The sash we buy already glazed; the doors we can buy, or

make batten doors if we like. If we decide on the latter, as the opening is 3 × 8 for the two doors, we get about 80 ft. more floor planks from the mill, and the necessary pieces for battens.

Therefore this is the lumber bill we go to mill with, supposing we make everything but the sash sills :

Sills	2 pieces,	6 × 6	18 ft. long	108
"	2 "	6 × 6	12 "	12
Floor joists	13 "	2 × 8	12 "	104
Plates	2 "	2 × 4	18 "	24
"	2 "	2 × 4	12 "	16
Studs	12 "	2 × 4	10 "	80
Rafters	12 "	2 × 4	18 "	144
Ceiling joists	8 "	2 × 4	12 "	64
Sheathing				360
54 boards		1 × 12	12 ft. long	648
6 "		1 × 12	16 "	96
64 strips		1 × 3	12 "	192
Flooring with doors				500
Door and window frames	4 ps	2 × 4	12 ft. long	32
" " "	3 "	2 × 4	16 "	32
" " "	2 "	2 × 6	12 "	24
Total number feet of lumber				2,496

2,880 shingles.
10 lbs. shingle nails.
50 lbs. tenpenny nails.
10 lbs. eightpenny nails.
2 pairs national butts and screws for same.
2 5-in. rim locks, 1 right, 1 left, with knobs, &c.
2 5-in. barrel bolts.

As soon as we have the stuff on the ground, it is well to spread out the flooring and siding along the fence ; or put up a temporary rack for it, and turn it three or four times a day,

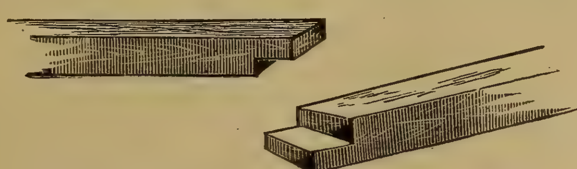


Fig. 79.—The Ends of the Sills.

Cut off the sills square, of the exact lengths of 12 and 18 ft. halving the ends together in the manner shown in fig. 79, always remembering to pick out the straight side, to mark it, and lay out the cuts from that side.

Cut off the plates square in the same way and halve them together. Cut 24 boards 11 ft. 6 in. long; square at both ends. Cut the floor joists 12 ft. long, and square.

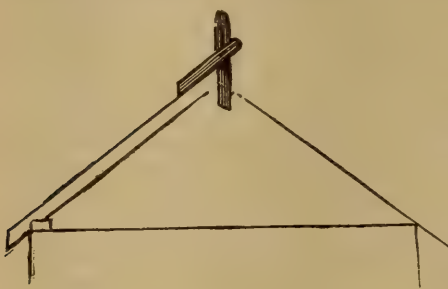


Fig. 80.—*Drawing of Roof.*

Cut the roof rafters, but first make a drawing of the roof on a smooth board, of large enough scale for you to set the bevel by. The adjoining sketch (fig. 80,) will show what we mean. Better make your drawing $1\frac{1}{2}$ in. to a foot or even 3 in. to a foot if you have a good sized board. The first rafter you cut out will serve for a pattern for the rest, and you can mark them by it. Be particular to make all cuts square. You will see the rafter notches over the plate at the bottom as shown in fig. 80. Cut 8 pieces for ceiling joists.

We are now ready to lay out our foundation which we do as shown in the sketch, fig. 81, being very particular to make the corners square.

For use about the building we should make a ten foot rod as soon as we come on the ground. Make this rod of a sound strip 1 in. square, and dressed off all round, with the feet plainly marked and numbered upon it. Be careful in setting out the size of the building, to have the cord or line 2 or 3 inches off the ground, nearly level as may be; then you can dig the holes for the pier footings without disturbing it.

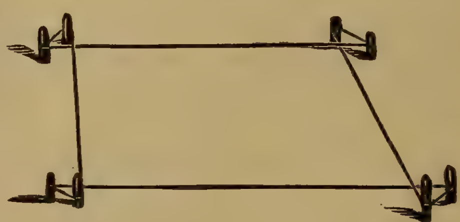


Fig. 81.—*The Ground Laid Off.*

We will start our first pier on the highest corner, and carry it up 2 ft. above the ground. When it is of the required hight place the plumb rule, or any other straight edge, on top of it; bring it up exactly level with the spirit level, and sight along the bottom edge, as shown in our sketch; and by an

assistant marking on a rod at the other corner you can tell how many courses of brick you will have to come up above your footings You can also test all your corner piers in this way; of course, for the piers between you will have ample guides after the corners are up, as you can look across the tops and see how they range.

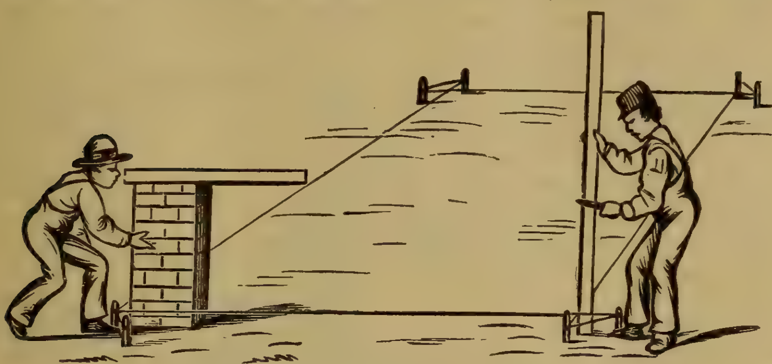


Fig. 82.—Sighting for the Piers.

Be very particular always to get your house laid out exactly square, and have all the piers level; if you put up plumb work on such a foundation, everything about your house will "come right."

As explained in a preceding page, the spirit level, when used on dressed work such as door and window frames, will tell us if things are plumb; but the spirit level is only about 30 inches long, and about a building, where the sawed lumber is not always straight, we require a plumb rule. This is generally a piece of inch board about 4 in. wide and 5 or 6 ft. long, dressed up perfectly straight and square, of an exact width, with a gauge mark down the center, and an opening cut at one end to receive the plumb bob, while a saw cut at the other end holds the cord which suspends the plumb bob.

Of course it will be seen that when the plumb rule is held against an exactly upright body the cord which holds the bob will hang directly over the gauge line in the center of the plumb rule; and if the body inclines either way the bob will hang off the center line and indicate in what direction the body overhangs. The plumb rule is in constant use about a building, and great care should be taken in making it to have it perfectly true.

Lay on the sills and level them up, spiking them together at the corners. Then lay on the floor joists on the proper distances. Always take care in laying floor joists, if they are not straight, to put the rounding edge up. Nail the floor joists to sills by toeing nails in alongside of joists. Select 8 of the best siding boards with straight edges ; 4 of them you will saw off to the bevel of roof ; these boards are for the corners ; tack them up to the corners, plumb them and keep them plumb by temporary stays inside. In fig. 83 we give what is termed an *isometrical* drawing of the frame of the house put up. "Isometrical" means equal measure, and an isometrical drawing is one in which the scale is equal on all the lines. They can all be measured, being unlike a perspective drawing to which it bears some resemblance. No object in reality could be seen like that, but such a drawing often enables a draughtsman to show the detail of a piece of work which he could not show in any other way.

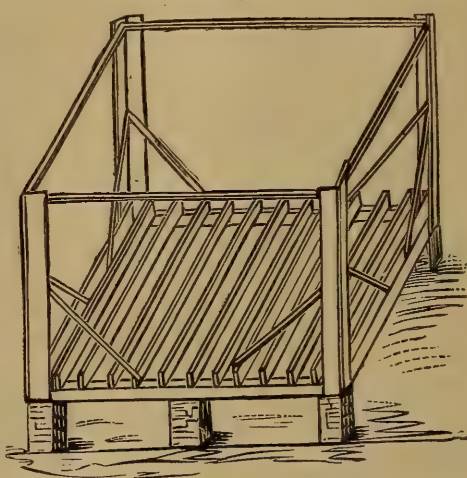


Fig. 83.—*Isometrical Drawing.*

After understandingly reading as far as this, we think no one who can drive a nail and saw a board square need have any difficulty in closing-in this house ; of course leaving spaces for the door and window frames ; remembering to let the siding boards run up two in. above the plate, or you'll have a 2 in. hole there between the plate and the under side of the roof sheathing. You must cut the rafters neatly through the siding boards. In the gables, after having put up the corner board sawed to the right pitch, you can run the others up unsawed, making them even only with the bottom of the sill, and when you get up the two gable rafters you can nail the side boards to them, and saw them off up there.

The roof rafters can be nailed together at the ridge joint, on a platform of a few sheathing boards laid across the plates,

and set up in their places. As the projection at gable is only 12 in., and 1 in. sheathing boards, are pretty stiff, no rafters will be required beyond the walls. On the gable ends let the sheathing boards run out a little over as you nail them on, then snap a chalk line on them, and saw them off to 12 in. projection, nailing the 4 in. strip, as mentioned in specifications, across the ends of the rafters on the eaves, and on edge of sheathing on the gables. The shingles you start at the bottom, laying a double course there, and then marking up 5 in. in each end. You snap a chalk line for every course, and set the ends of shingles on the line, nailing each shingle with 2 shingle nails. The chimney should be above the roof when you shingle, so that you can fit about it neatly.

As some of our readers may not know what blind nailing is, we give, in fig. 84, a sketch of the operation; it is the only

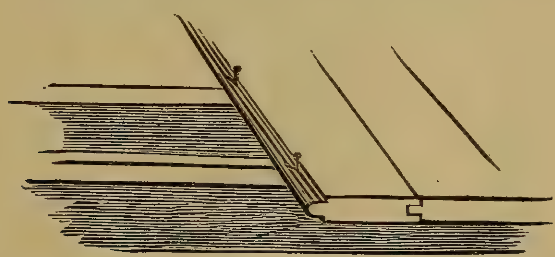


Fig. 84.—*Specimen of Blind Nailing.*

neat way of fastening down a floor, for by it not only are the unsightly nail heads hidden, but the act of driving the nails tends to tighten up the joint on the floor. It will be seen that the nails are driven into the corner on the upper side of the tongue. Great care must be taken in blind nailing not to bruise or mar the edges of the plank over the head of the nail, thereby leaving unsightly holes in the joints of the floor.

These sketches, fig. 85, of the door and window frames will give you an idea of how they are made. The stuff for the frame is dressed up square, 2 in. thick, 4 in. wide, and the inch casings 4 in. wide; sills 2 × 6. Notice that the stiles, or side upright pieces, are "gained," or let into the heads and sills, half an inch; it will be seen that the window casing is put on half an inch over opening. This is to form a stop for the sash, while the door jamb is rebated (see page 23) to receive the door, the casing edge being flush with the jamb.

Of course, the rebate must be made according to the thickness of the door. A half inch square strip keeps the sash in place inside. The sills of both door and window frames are half an inch lower on the outside edge than inside; this is to throw off water.

To an experienced mechanic much of the foregoing description of the operations to be performed in the erection of an

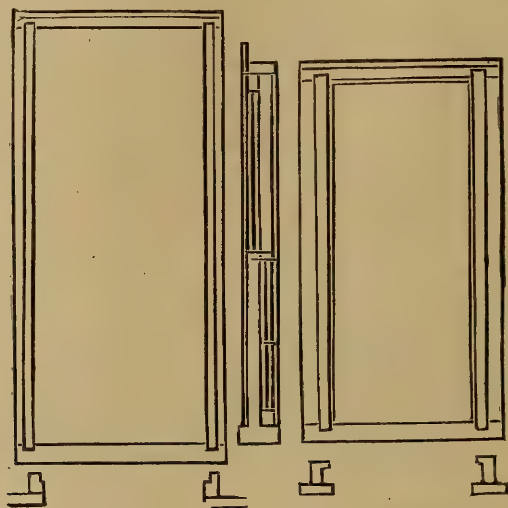


Fig. 85.—*Door and Window Frames.*

ordinary one room box house may have seemed trivial and unnecessary, but we have presumed that we might have one or two readers to whom a word of simple explanation of commonly well known matters might be important. We shall now give the drawings and specifications of a neat little plastered cottage, with a story and a half main part, and a one story wing. All plastered, it can be built for from $800 to $1,000, according to location.

If you do all the work yourself, the one story building can be built for a cash expenditure within $100. It will serve very well as a kitchen extension to the cottage shown, in fig. 86, page 67.

Fig. 86.—Front Elevation of a One-and-a-half Story House

SPECIFICATIONS OF STORY AND HALF HOUSE.

Specification of the material to be furnished, and of the labor to be performed, in the erection and completion of a frame dwelling-house, one and a half stories high, with one story wing, to be built at ——, in ——, for Mr. ——, according to the accompanying drawings which have been prepared by ——, and which are to be regarded as illustrating and forming part of these specifications :

DIMENSIONS.

The building will have a frontage of 28 feet altogether. The main part will be 24 ft. in depth ; the wing will be 14 ft. ; the hight of first story will be 8 ft. 6 in. The hight of second story will be 5 ft. to slant of roof, and 8 ft. to level part of ceiling. These hights will be in the clear from floor to ceiling when building is finished. The porch will be 6 ft. wide. and 13 ft. long. For the arrangement of the rooms, stairs, doors, windows, &c., reference is hereby made to the plans.

FOUNDATIONS.

The sills will rest upon piers $1\frac{1}{2} \times 2\frac{1}{2}$ bricks in size, started on a footing of 2×3 bricks, two courses high, laid 8 in. below the ground surface, and they will be carried up 2 ft. above the highest ground over which the house is placed ; they will be placed in the positions indicated by the dotted

lines on the plan of first floor, the piers under the porch will be 1 × 2½ bricks in size placed as indicated.

The chimney flue in main house will be started on the ground, on a footing of 2½ × 3½ bricks in size, 3 courses high, laid 12 in. below surface of ground; it will be carried up on that footing 1½ × 2½ bricks in size. The inside of the flue must be smoothly plastered with mortar, and 4 iron thimbles will be set in it, in front and back rooms, on first and second floors, to admit stove pipe; thimbles to be fitted with neat tin covers.

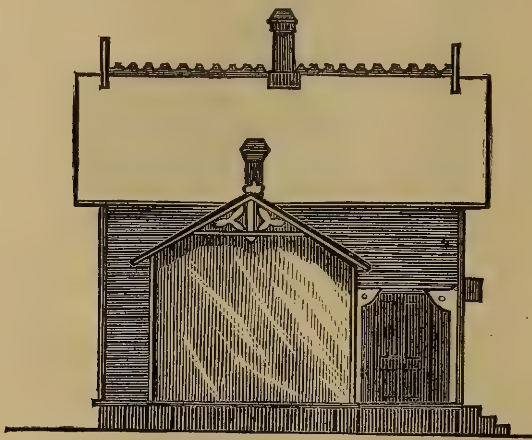


Fig. 87.—Side Elevation of Story-and-half House.

The chimney flue in the wing will be started on ceiling joists, which will be securely hung to roof rafter to sustain it; stove pipe will enter with double tin collar about it in the ceiling; flue must be smoothly plastered inside. Both flues must be topped out above the roof in a neat way, as shown on the drawing.

TIMBER.

All the timber used throughout must be of good quality, and as well seasoned as can be procured in the locality. It will be of the following dimensions: sills, 6 × 8; floor joists, 2 × 8, placed 16 in. from centers; the collar beams, 2 × 4; the roof rafters, 2 × 4, placed 16 in. from centers; the wall studding will be 2 × 4; the plates, 4 × 4; the porch floor joists will be 2 × 6; the porch roof rafters, 2 × 4.

ROOF AND COVERING.

The roof of main house and wing will be sheathed with 1 in. sheathing boards, well nailed to the rafters, laid close, and covered with the best quality of sawed shingles, laid 5 in. to the weather, with the joints well broken.

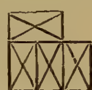
The roof of the porch will be covered with good quality of roofing tin, put on with standing lock joint, and well painted with two coats of mineral paint in oil.

EAVES, CORNICE, GABLES AND CORNER BOARDS.

The eaves and gables will be finished by a 6 in. square corona, 1 in. thick, nailed to ends of roof rafters, which will be sawed off 2 in. square, where they project beyond the siding; the edge of the sheathing boards will be finished with $1\frac{3}{4}$ in. round; the gables will be finished as shown in the detail drawing with 2×4 cross and upright pieces, and inch board sawed as shown in the panels. The finials and ridge ornaments will be sawed out of $1\frac{1}{2}$ in. plank, as shown on detail drawings; also porch cornice and columns. The corner boards will be $3\frac{1}{2}$ in. wide, of $1\frac{1}{4}$ in. stuff.

WALLS, SIDING AND WATER-TABLE.

The walls will be of 2×4 studding, with double corners each way like this:



and the studs will be doubled at the door and window openings.

The walls will be sided with good quality of narrow weather boards, with $1\frac{1}{4}$ in. lap, put on with eightpenny brad-head nails, set in with nail set.

The water-table will be 8 in. wide, $1\frac{1}{2}$ in. thick, with rebated strip on top, so that the weather boards will set over the lip on the back.

JOISTS AND FLOORING.

The floors will be laid with a good quality of mill-worked flooring, laid in courses not over 5 in. wide, blind nailed to each joist.

The floor joists will be gained into sills, flush with top, so that flooring will lie on top of sill.

The floor joists of second floor will rest in ribbon piece, 1×4 in., let in flush with inside edge of joists, and nailed to side studding.

PLASTERING.

All the walls and ceilings inside the house are to be lathed and plastered; joints of lath to be broken every sixth lath, and each whole lath to have four nailings; all corners to be

made solid, no lath to be shoved through behind intersecting partitions.

The plastering will be two coats of brown mortar well haired, with a skin of plaster-paris. All angles must be made straight and plumb.

The first two coats of mortar will be put in to come flush with door and window casings, which will then be molded, and the skin of plaster-paris will finish to the band molding, as shown on the detail drawing.

WINDOWS.

The windows will all have double hung box frames with 1¾ in. axle pulleys, and the best quality patent sash cord; sashes 1⅜ in. thick, will be made in four lights, as shown on drawing; glass, 15 × 36 in.; three windows on first floor; glass 10 × 34 in double window; glass in windows on second floor. 15 × 28. First floor windows will have neat sash fastenings on the meeting rail.

DOORS.

Doors on the first floor will be 3 × 7 ft. in size, 1⅜ in. thick, made in 4 panels O. G. on edge raised panel. The doors upstairs will be 2 ft. 6 in. × 6 ft. 6 in., and 1⅜ in. thick, four panels. The doors will be hung with 3 in. "national butts," to 2 in. rebated frames, and will be secured by 5 in. rim locks, with white porcelain knobs. The two outside doors will have 6 in. square bolts, put on just below lock.

INSIDE FINISH.

The inside finish will be of good, well seasoned lumber, and will be trimmed according to the detail drawing. The base will be 8 in. beveled base, ¾ round against it on the floor.

STAIRS.

The stairs will be put up as shown on the plan, with 1¼ in. plank stringers nailed to studding on both sides; steps 1⅛ in. thick, the risers ⅞ in. thick.

PAINTING.

All the wood work about the house, inside and outside, usually painted, is to have two good coats of lead and oil paint, of such color as the owner may direct; the painter will properly putty all nail holes, and other imperfections in the wood which may require it; also sandpaper the work properly and cover all knots and sap wood with gum shellac before painting.

All windows will be glazed with best quality of sheet glass, well tinned and puttied.

FINALLY.

Execute any and all further work necessary to complete the building fit and ready for occupation, which may be shown by, or which may be reasonably inferred from the drawings, although not herein specified, and if there is anything mentioned in these specifications, which is not shown on the drawings, or if there be anything omitted in the specifications which is shown on the drawings, the same is to be done without extra charge, so that the building may be completed according to the full intent and meaning of both drawings and specifications.

DETAIL DRAWINGS.

We will now give the detail drawings referred to in the specifications, with such explanatory remarks as they may seem to need, although of course it will not be necessary in our description of this building to give such minute directions as in the former one described. Remember, however, that you cannot be too particular to get everything about the house level and plumb from the very start.

The end view (fig. 88) of the frame of the main house when put up will give you an idea of how it is put together. You will notice the 6×8 sills under the 2×4 wall strips on either side. You will observe in the specifications you are directed to *gain* the floor joists into the *sills*.

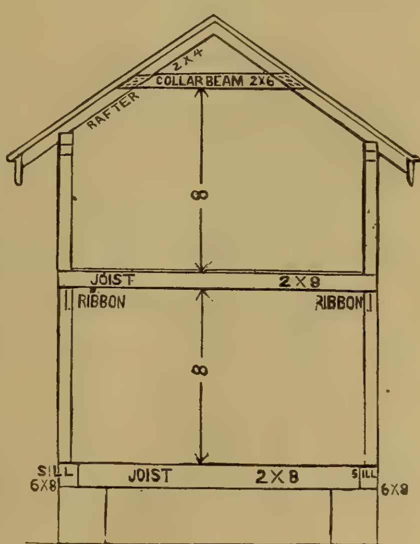


Fig. 88.—*End View of Frame.*

Below the section of the house framing you will see the sill with one gain cut in it and the end of the floor joist cut to go into the gain, which is 2 in. square and 4 in. deep, so in cutting your floor joists the length at the top will be 13 ft. 4 in., as you see the

8 in. thickness (4 in. at each end of floor joist), makes the full width of frame, 14 ft. The gains are made by cutting with saw 2 in. at top and 4 in. down the side, and cleaning out the opening with the mortising chisel. Of course you space off and mark the places for gains on each sill before you begin; indeed, it is the secret of getting on fast with work to lay off everything you can, mark it, have it cut, and on the ground ready to put together before you commence to put up your frame; when this is done, it is astonishing how quickly you can put up a frame; but to do it you must carefully make on a good sized board, a drawing of what you are about, like these we show here, but on a larger scale, say 1½ or 3 in. to a foot. Your steel square and flat carpenter's pencil will be all you want to do that, but you must take care and *think* all the time what you are doing, or you will be making costly blunders.

The advantages of gaining the floor joists into the sills are these: the floor plank lie over the edge of the sill, and there is no inside communication between the walls for rats and mice to take advantage of; if this opening is left, as it will be in case we put on the floor joists as we did in our first house, the rough inside of the plastered wall makes a first-rate ladder for those household pests; there is also one floor joist saved at each end of the house, as the floor plank can be nailed on the sills in that case You must be careful in marking for the gains to match your 4 in. always from the top edge of both the sills and joist, then all will come flush on top; otherwise, owing to rough framing timber often varying ¼ to ½ in. in width, you may have some chiseling out to do, and may have to put in chips or wedges to make an even surface, and these are said always to indicate a poor workman.

The ribbon piece is seen under the ends of the second story floor joists. It is let into the edge of wall joists flush, and the gains for it are cut on the ground before you put up your frame. The second story joists are cut 14 ft. long, rest in the ribbon strip and are nailed against the wall studs. The wall studs, second story joists, roof rafters and collar beams (that piece which forms the level part of ceiling on second floor is the collar beam) are all placed 16 in. apart from centers; the reason for this is that the laths which are nailed to them are 4 ft. or 48 in. long, and they require four nailings in their length to make a proper plastered wall, and with 16 in. spaces they have a nailing at each end, and two in between them.

The wall studs are 16 ft. long. The distance between the

joists is marked in the drawing, making allowance for the floor below and the ceiling above, for the specification says the hight must be *in the clear* when finished.

The *plates* are the pieces running across the upper ends of the wall studs, on which roof rafters rest, the length of the building. They may be made of two 2 × 4 studs nailed together on the ground, and the proper distances of the wall studs must be plainly marked in them, as well as the sills. Now to put them up, if there be only two of you at work on the job, all studs and everything being ready cut to the length, set up the two corner posts on the sill, toe-nailing them well; plumb them and nail good stout braces on them plumb, as with the corners of our first house; also put up another wall stud on the place marked for it on sill, about half way between the corners; also plumb and brace this too; now by means of a couple of ladders placed at the corners, you and your partner can carry up the plate, and nail it strongly to top of the corner studs; then while one of you sets up the studs and nails below, the other can straddle the plate and nail in the wall studs one after another according to the marks already made on the plate.

The walls should be put up and sided, as a general thing, before you put up the roof rafters, as the building is so much stiffer when the siding is on. It was explained in talking of our first house, how we cut the roof rafters; it will be seen in the drawing that we have ripped the rafter down to 2 in. where it projects beyond the wall; this is done to make it look less heavy as it shows from below; and as it is to be painted we jack off the rough before we put it up. You can make a platform across house with plank or joist, and nail the rafters and collar beams all together; then set them up in place; this will be found more convenient than to nail them together on the ground, as they are awkward things to handle after they are together.

You will take notice that the roof of the wing is of a different pitch from the main house; this is made so as to bring its ridge under the eave of main house. We think, from the previous remarks we have made you can lay off the rafters for the wing roof without further explanation.

The top of porch timbers being 2 × 6 will come 2 in. below the top of sill of the house, so that the bottom of door sills which are cut to let down an inch into the house sill will rest on the porch floor, while the house floor, which we suppose to be of inch plank, will come flush with top of door sill, and a

saddle or carpet strip covers the crack. The porch timbers will run lengthwise, and should be supported by a bearer from the middle pier to the house sill; the porch floor should be 1½ in. lower in front than at the back, so that water will not lie there in stormy weather. To secure this fall, reduce width of your front porch floor joists, for to pitch them down would bring the bottom edge off the bottom line of building, and by the drawing you see it is all straight.

The porch finish is shown in our illustration of front elevation, fig. 86, page 67. In this porch the columns are made of 2×2 in. strips planed up square; the open space between is 5 in. wide, and has ornamental sawed work 1 in. thick fitted in it; the scroll in the angle is 2 in. stuff; the frieze—that piece resting on top of the columns, 8 in. wide and 2 in. thick; the roof rafters rest on top of it, and project beyond it as shown on the drawing, with the ends cut to a pattern; the roof is laid on these, floor plank will do for this, put on with the planed side down; of course the roof rafters, and all the other wood work about the porch which shows should be planed.

This porch can be put up cheaply and yet will look neat and tasty. Be careful when setting out your porch to have the line of the foundation piers, 12 in. inside of the line of the house piers; then the edge of your porch cornice will come flush with wall of house, otherwise it will project beyond house walls and look badly; you will see what is meant by looking at the plan of first floor, fig. 76, page 54.

The eaves of this house will be finished like those of our first house, only the stuff will be planed, because we want to paint it. The bottom side of the sheathing boards where they lie over the rafters must also be planed, as that shows from below. On the gables, where the projection is 18 in. as at the eaves, the sheathing boards will be supported by stout pieces of roof rafters, halved down on end inside rafter, and running back inside, being well fastened to next rafter; they will be placed at same distances as rafters which show beyond eaves.

The corner boards are put on—after the water-front—as soon as the frame is up; the ends of weather boards should make tight joints against them.

The finish of the gable is shown in our illustration (fig. 89) on next page. All the ornamental sawing is now done at the mills, but of course it can be performed with a hand compass saw. The ridge cresting and finials should be 1½ in. thick.

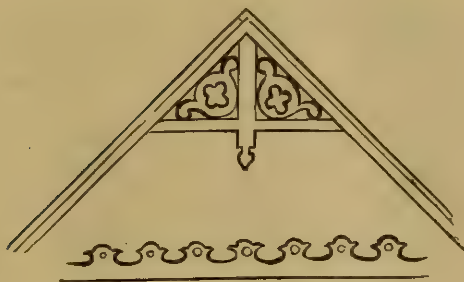


Fig. 89.—Finish of the Gable.

Fig. 90 shows the construction of a box window frame. The names of the different parts are marked on them. By this drawing you see the necessity of putting double studs at door and window openings; the second stud here gives us a nailing for the weather boards outside.

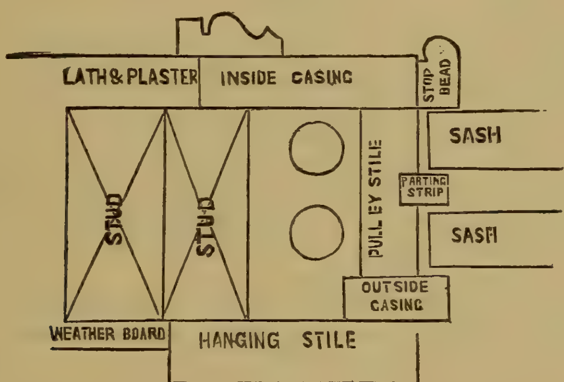


Fig. 90.—Construction of Box Window Frame.

The inside casing is ½ of an inch thick, and plastering is finished up to that surface; then the molding is put on, projecting over the molding on the plaster; if the casing shrinks there is no opening to be seen between it and the plaster, as there would be if back edge of the molding was fair with the back edge of the casing. The *beveled* base with three-quarter round against it will be understood by looking at the drawing, fig. 90.

In fig. 91 we show the door trimming, with 2 in. rebated jamb for door, casings, &c.

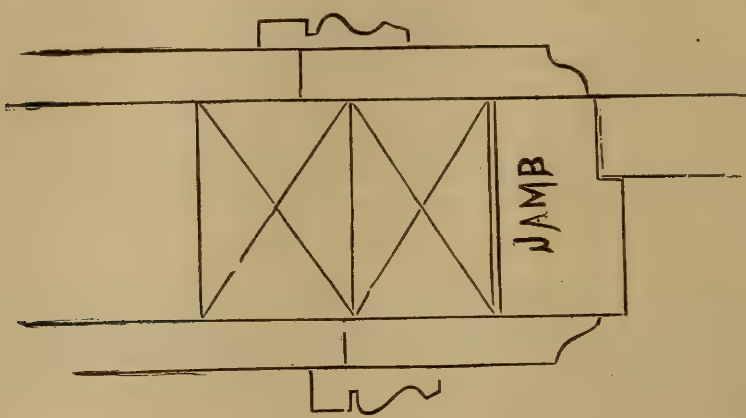


Fig. 91.—Door Trimming, Jamb, Casings, &c.

In regard to the stairs, you will have no difficulty if you take exactly the hight from the *top* of the first floor to the *top* of the second floor, and divide that distance into risers as near 7½ in. as they will come; then the runs will be ten. After you pass the four bottom risers it will be plain work; as for the bottom risers, if you lay them out on the floor, in the opening where they are to be placed, you will see more readily how they are to go up, than you could from any explanation we might give here.

We have only provided for setting this house on piers; a cellar could be dug under the main part, with stairs leading down below the second story ones.

We will now give a bill of materials for the house shown in fig. 86, page 67.

BILL OF MATERIALS.

Sills, 2 pieces, 6 × 8, 24 ft. long, sides of main house	192
Sills, 5 pieces, 6 × 8, 14 ft. long; ends of main house, and all about wing	280
Floor joists, 46 pieces, 2 × 8, 14 ft. long; first and second story, main house and wing	858
Carried forward	1330

Brought forward	1330
Collar beams, 19 pieces, 2 × 6, 12 ft. long; main house, second story ceiling	228
Ceil joists, 12 pieces, 2 × 6, 14 ft. long; wing ceiling	168
Rafters, 38 pieces, 2 × 4, 12 ft. long; main roof	304
" 16 pieces, 2 × 4, 10 ft. long, wing roof	107
" 4 pieces, 2 × 4, 14 ft. long; porch roof	38
Walls, 77 pieces, 2 × 4, 16 ft. long; main house, allow for corners and openings	820
" 44 pieces, 2 × 4, 10 ft. long; wing, corners and openings doubled	285
Plates, 12 pieces, 2 × 4, 12 ft. long; main house and wing	96
Floor joists, 4 pieces, 2 × 6, 14 ft. long; porch floor	56
Sheathing for both roofs	968
Weather boarding all round; there are 1684 sq. ft. of surface; to get enough stuff from the mill to cover this surface you must order 25 per cent. additional to allow for loss, and which makes	2,105
Flooring 1 in. thick, 50 per cent. allowed in addition to actual surface covered	1,575
Base	165
Porch	75
Water-table	110
Total feet of lumber	8,430

7 doors and frames, 3 × 7, 1st floor.
2 " " 2 ft. 6 in. × 6 ft. 6 in., 2d floor.
1 double window, 1st floor.
3 single " "
2 " " 2d floor.
Plastering, 375 feet.
7,750 shingles, reckoning 800 to 100 square feet.

We have put no prices on the materials, as rates vary according to locality; such a house as this can be put up in the town where this book is written for $850.

THE FRAMING OF ROOFS.

Roofs of two slopes in narrow buildings, such as the small cottages which have been described in the previous part of this book, are composed of rafters alone, with a cross piece, forming a pair of opposite rafters into what is termed a *couple.* The rafters without the cross piece, or *tie beam,* would tend to thrust out the walls on which they rest; and this cross piece is intended therefore to act as a tie to counteract this thrust. Its position is consequently of importance, and from a false economy, or from an ignorance of its function, it is generally in buildings of an inferior class placed so high as to be of little use in counteracting the thrust.

This kind of roof, the couple roof, is only practicable in buildings of very moderate width. In wide buildings, the

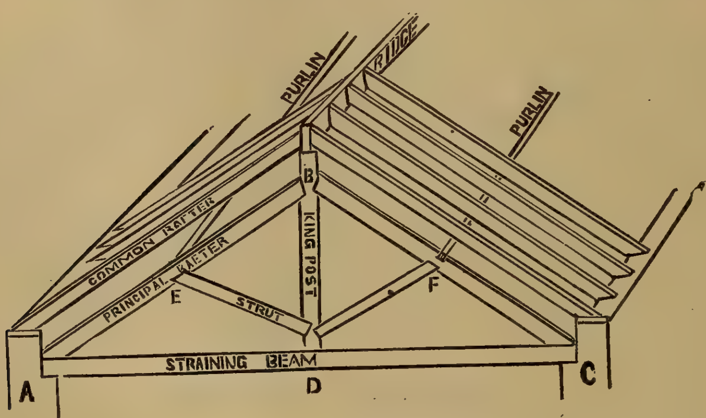


Fig. 92.—Framed Roof.

rafters would bend of their own weight unless made of great size or supported in some manner. When the width of the building exceeds these moderate limits, the rafters are kept from bending by a piece of timber parallel to the tie beam, called a *collar beam.* But it will be easily seen that couple roofs so formed, independently of consuming a great quantity of timber, can only be used for small spans; hence it is necessary to use the framed roof when the space to be covered

is a large one. In framed roofs the rafters are sustained by pieces of timber which lie under them horizontally, and divide their length into spaces less than the limit, at which the rafters will bend under the weight of the roof covering. These horizontal pieces are call *purlins*, and are sustained by trussed frames of carpentry, distributed transversely at equal distances in the length of the building, the distance being calculated in regard to the strength of the purlins.

Let us now examine the principles of trussing. Let A B, C B, be two rafters placed on walls at A and C, and meeting in a ridge B. Even by their own weight, and much more when they are loaded, these rafters would have a tendency to spread outward at A and C, and to sink at B.

If this tendency be restrained by a tie established between A and C, and if A B, B C, be perfectly rigid, and the tie A C incapable of extension, B will become a fixed point. This, then, is the ordinary couple roof, in which the tie A C is a third piece of timber, and which may be used for spans of limited extent; but when the span is so great that the tie A C tends to bend downward or sag, by reason of its length, then the conditions of stability obviously become impaired. Now, if from the point B a string or tie be let down and attached to the middle D, of A C, it will evidently be impossible for A C to bend downward so long as A B, B C, remain of the same length; D, therefore, like B, will become a fixed point, if the tie B D be incapable of extension. But the span may be increased, or the size of the rafters A B, B C, be diminished, until the latter also have a tendency to sag; and to prevent this, pieces D E, D F, are introduced, extending from the fixed point D to the middle of each rafter, and establishing F and E as fixed points also, so long as D E, D F, remain unaltered in length. The meaning of the verb "to truss" is to tie up. In this frame we truss, or tie up, the point D, and the frame A B C is a trussed frame, a roof in which such frames are employed is a trussed roof. In like manner, F being established as a fixed point, is trussed to it. In every trussed frame there must be evidently one series of the component parts in a state of compression, the other in a state of extension. The functions of the former can only be filled by pieces which are rigid, while the place of the latter may be supplied by strings. In the diagram the pieces A B, C B, are compressed, and A C, D B, are extended; yet in general the tie D B is called a *king post*, a term which conveys an altogether erroneous idea of its duties. Thus we see how the

two principal rafters, by this being incapable of compression, and the tie beam by its being incapable of extension, serve, through the means of the king post, to establish a fixed point in the center of the space spanned by the roof, which point

Fig. 93.—*Trussing with Straining Beam between the Posts.*

becomes the support of the struts, these at the same time preventing the rafters from bending, and serving in the establishing of other fixed points; the combination of these pieces is called a king-post roof.

It is sometimes, however, inconvenient to have the center of the space occupied by the king post, especially where it is necessary to have apartments in the roof. In such a case recourse is had to a different manner of trussing. Two suspending posts are used and a fourth element is introduced, viz., the *straining beam*, a b, (see fig. 93) extending between the posts.

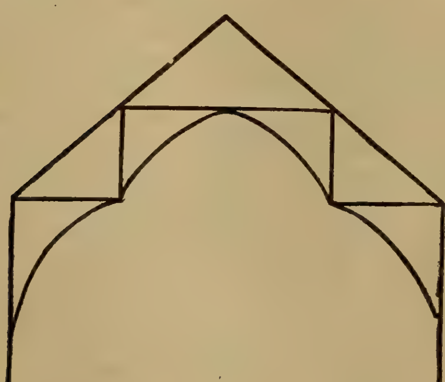


Fig. 94.—*The Hammer Beam.*

The principle of *trussing* is the same. The rafters are compressed, the straining beam is compressed, and the tie beam and posts (now called *queen posts*) are in a state of tension.

In some roofs, for sake of effect, the tie beam does not stretch across the foot of the principals, but is interrupted.

In point of fact, though occupying the place of, it does not fill the office of a tie beam, but acts merely as a bracket attached to the wall. It is then called a *hammer beam.*

It is a general rule that wood should be used as struts, and iron as ties; and in many modern trusses this rule has been admirably exemplified by the combination of both materials in the frames.

There are other principles used for roofs, as the *curved principle*, the *laminated arc*, &c., which will be found treated of in larger works.

TREDGOLD'S RULES.

We give below Mr. Tredgold's rules for proportioning the strength of the various pieces composing the roof. In estimating the pressure on a roof for apportioning the proper size of the timbers to be used, not only the weight of the timber and the slates, or other covering, must be taken, but also the weight of snow which in severe climates may be on its surface, and also the force of the wind, which we may calculate at 40 lbs. per superficial foot.

The weight of the covering materials, and the slope of the roof which is usually given, are contained in the following table:

MATERIAL.	INCLINATION.	WEIGHT PER SQUARE FOOT.
Tin	Rise 1 in. to ft.	⅝ to 1¼ lbs.
Copper	" 1 " "	1 " 1½ "
Lead	" 2 " "	4 " 7 "
Zinc	" 3 " "	1¼ " 2 "
Pine Shingles	" 5 " "	1½ " 2½ "
Long Cypress Shingles	" 6 " "	4 " 5 "
Slate	" 6 " "	5 " 9 "

In the following rules Tredgold assumes 66½ lbs. as the weight of each square foot. It is customary to make the rafters, the beams, posts and struts all of the same thickness.

IN A KING POST ROOF OF PINE TIMBER.

TO FIND THE DIMENSIONS OF THE PRINCIPAL RAFTERS.—Multiply the square of the length in feet by the span in feet, and divide the product by the cube of the thickness in inches; then multiply the quotient by 0.96 to obtain the depth in inches.

Mr. Tredgold gives also the following rule for the rafters as more general and reliable:—

Multiply the square of the span in feet, by the distance between the principals in feet, and divide the product by 60 times the rise in feet: the quotient will be the area of the section of the rafter in inches.

If the rise is one-fourth of the span, multiply the span by

the distance between the principals, and divide by 15 for the area of the section.

When the distance between the principals is 10 feet, the area of the section is two-thirds the span.

To find the Dimensions of a Tie Beam, when it has to support a Ceiling only.—Divide the length of the longest unsupported part by the cube root of the breadth, and the quotient multiplied by 1.47 will give the depth in inches.

To find the Dimensions of the King Post.—Multiply the length of the post in feet by the span in feet: multiply the product by 0.12, which will give the area of the section of the post in inches. Divide this by the breadth for the thickness, or by the thickness for the breadth.

To find the Dimensions of Struts.—Multiply the square root of the length supported in feet by the length of the strut in feet, and the square root of the product multiplied by 0.8 will give the depth, which multiplied by 0.6 will give the thickness.

IN A QUEEN POST ROOF.

To find the Dimensions of the Principal Rafters.—Multiply the square of the length in feet by the span in feet, and divide the product by the cube of the thickness in inches: the quotient multiplied by 0.155 will give the depth.

To find the Dimensions of the Tie Beam.—Divide the length of the longest unsupported part by the cube root of the breadth, and the quotient multiplied by 1.47 will give the depth.

To find the Dimensions of the Queen Posts.—Multiply the length in feet of the post, by the length in feet of that part of the tie beam it supports: the product multiplied by 0.27 will give the area of the post in inches; and the breadth and thickness can be found as in the king post.

The dimensions of the struts are found as before.

To find the Dimensions of a Straining Beam.—Multiply the square root of the span in feet by the length of the straining beam in feet, and extract the square root of the product; multiply the result by 0.9, which will give the depth in inches. The beam, to have the greatest strength, should have its depth to its breadth in the ratio of 10 to 7; therefore to find the breadth multiply by 0.7.

To find the Dimensions of Purlins.—Multiply the cube of the length of the purlin in feet by the distance the purlins are apart in feet, and the fourth part of the product will give

the depth in inches, and the depth multiplied by 0.6 will give the thickness.

To find the Dimensions of the Common Rafters when they are placed 12 inches apart.—Divide the length of bearing in feet by the cube root of the breadth in inches, and the quotient multiplied by 0.72 will give the depth in inches.

In designing the framing for a roof keep closely in mind the following:

Beams acting as struts should not be cut into or mortised one side, so as to cause lateral yielding.

Purlins should never be *framed* into the principal rafters, but should be notched. When notched they will carry nearly twice as much as when framed.

Purlins should be in as long pieces as possible.

The ends of tie beams should be kept with a free span around them to prevent decay.

It is an injudicious practice to give an excessive camber to the tie beam; it should only be drawn up when deflected, as the parts come to their bearings.

The struts should always be immediately underneath that part of the rafter whereon the purlin lies.

The diagonal joints of struts should be left a little open at the inner part, to allow for the shrinkage of the heads and feet of the king and queen posts.

All cracks or bends in iron ties should be avoided.

And as an important final maxim—*Every construction should be a little stronger than strong enough.*

How to Pile Lumber.—Lumber should not be allowed to depreciate for lack of proper care in piling. Piles should be built so that the front cross piece shall be higher than the back, and each in succession be overlapped, or laid out a trifle beyond the previous one. A pile 20 feet high should incline outward from base to top at least 18 or 24 inches, which will prevent storms from eating in, or snow from resting to melt and form ice. The sides of the pile should be carried up plumb, each cross piece directly on top of another, so that the weight shall rest solidly on each, and on the foundation timber. If the courser be placed a little forward or back of the previous one the weight above will twist, warp and perhaps break the lumber. Piles should never be placed less than 3 feet apart, and boards in the pile should always be laid with from 2 to 4 inches of space between them.

LEVELING.

Where the ground is limited in extent, and variations of level do not exceed 12 ft., the hights of any points may be found with the spirit-level in the following manner:

In a convenient place near the highest part of the ground, drive three stout stakes at equal distances from each other,

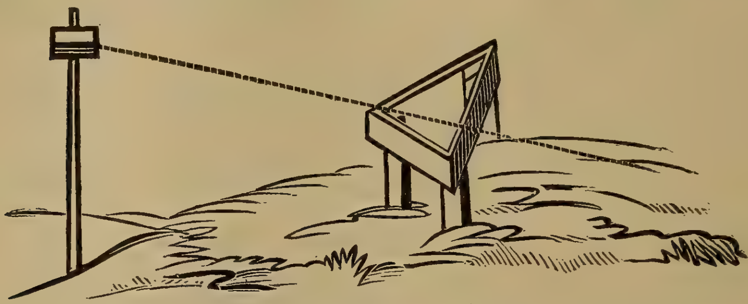


Fig. 83.—*System of Leveling Small Plots of Ground.*

and nail to them three pieces of stout plank, as shown in the cut, their upper edges being most accurately adjusted by the spirit level. The level being then placed on the frame an assistant proceeds to the first point of which the hight is required, holding up a rod with a sliding vane which he raises or lowers in obedience to the directions of the surveyor, until it coincides with a pair of sights at the bottom of the level; when the cross mark on the vane, and the two sights on the level are all three in line, the hight of vane will be the difference in level between the top of the leveling frame, and the place where the staff was held up.

Rats in Cellars.—To prevent rats from burrowing into cellars, either make a good water lime floor, or else build the wall on a close-jointed flagging, laid some inches below the bottom of the cellar, and projecting some three or four inches beyond the wall. The rat burrows down next to the wall, reaches the flagging and cannot pass through it, never in any case working back to the edge.—*Rural Annual.*

FORM OF CONTRACT.

THERE should always be a contract or agreement attached to the specifications, in which should be stated what both parties to the bargain are to do; what work the builder performs; what materials he is to furnish; and, on the part of the owner, how he is to pay, and when. There are two copies of this agreement prepared, and both parties sign both copies, each party keeping a copy. The agreement which we give below is one very generally used; we believe it contains all that is necessary in a contract for an ordinary building; if anything more is required in any particular instance, it will suggest itself from the circumstances of the case.

CONTRACT.

Agreement made between Mr. A. Bee, *of* ——, *in the County of* ——, *State of* ——, *of the first part, and Mr.* C. Dee, *of* ——, *in the County and State aforesaid, touching the erection of a frame dwelling-house for the said* A. Bee, *to be located on* —— *Street, in* ——, *and the complete finishing the same in all its parts by the party of the second part, according to the full intent and meaning of the plans and specifications of date herewith, and signed by both parties hereto. Said plans and specifications to be considered as a part of this agreement.*

The said C. Dee, in consideration of the covenants and agreements hereinafter contained, by the said A. Bee, being duly kept and performed, does covenant, promise and agree that he, the said C. Dee, shall commence the work immediately and prosecute it to its completion without any delays of the same, except such as are inevitably caused by the strike of workmen or the state of the weather, and that he will perform all labor and furnish all materials necessary to complete the work so as to satisfy the provisions of this contract, in accordance with the requirements of the plans and specifications, in the most thorough and workmanlike manner, under the superintendence of to his satisfaction, and to the acceptance of the owner, on or before the day of now next ensuing the date hereof. And it is hereby expressly agreed that the said C. Dee shall pay and allow the said A. Bee, for each and every day, except the aforesaid. beyond

said day of , the sum of dollars as liquidate damages. But if the work is delayed by the causes aforesaid, the said C. Dee is to be allowed one extra day for each and every day of delay to complete said work.

And the said A Bee, in consideration of the above promises being well and truly kept, doth, for himself and his executors, agree well and truly to pay, or cause to be paid, unto the said C. Dee, or his legal representatives, the following sum, to wit, dollars, in the manner following: When the building is raised and enclosed, dollars; when the plastering is finished, dollars; and the balance, dollars, within thirty days after the building is completed and accepted by the architect and proprietor, free from all charges by way of lien or other attachments.

No extra work shall be performed or materials furnished, beyond that provided for by this agreement, and the plans and specifications aforesaid, nor shall the work be changed or in anywise varied by the said C. Dee, except upon request made by the said A. Bee, who shall have the right to vary and alter, so far as respects any part of the work or materials at any time remaining to be performed or finished by the said C. Dee. And in case a request is made by the said A. Bee, to have any change or alterations made, the price shall be agreed upon, and the bargain made in writing, and signed by both parties hereto, before such changes or alterations are commenced. And if any difference of opinion shall arise in regard to the price of extra work, it shall be referred to the architect and two disinterested persons, one to be chosen by each of the parties hereto, and their decision shall be final and binding on all parties.

It is further agreed that insurance shall be effected upon the building in some company approved by the said A. Bee, immediately after the first payment, to the amount of said payment, and to be increased after each payment to the amount of the sum of all the payments then made, said policy of insurance, to be in the name of and for the benefit of the said A. Bee, in case of loss or damage; he paying one half, and the said C. Dee paying one half the expense of the policy.

In witness whereof, the said parties of the first and second parts have hereunto set their hands and seals this day of eighteen hundred and

A. Bee.
C. Dee.

Executed in presence of

John Doe.
Richard Roe, } Witnesses.

GLOSSARY.

THE following short glossary of the terms used by carpenters in describing their work, will doubtless be found useful to many of our readers, especially beginners at the trade.

ABACUS.—The upper member of the capital of a column.
ABUTMENT.—The solid part of a pier from which the arch springs.
ADZE.—A well-known curved cutting instrument for dressing or chipping horizontal surfaces.
ANGLE BEAD.—A bead nailed to projecting angles in rooms to protect the plaster on the edge from injury.
ANTA (plural *Antæ*).—A pilaster attached to the wall not usually diminished from bottom to top.
APRON.—The piece under sill in inside finish of window.
ARCHITRAVE.—The lowest part of the entablature resting immediately on abacus. Carpenters frequently call door and window casing, molded or plain, architraves as the case may be.
ANIS.—The sharp edge formed by any two surfaces which meet at an angle. The edges of a brick are anises.
ASTRAGAL.—A small molding, semi-circular or semi-elliptic; sometimes carved.
BACK LINING.—The pieces in a box window, back of and parallel to the pulley stile, and next the wall, forming the weight box.
BACK OF A HIP.—The upper edge of a hip rafter.
BACK OF A RAFTER.—The upper edge of it.
BALCONY.—A projection built out from the surface of a wall, usually supported by brackets.
BALUSTER.—A small pillar serving to support a rail, for balcony stairs, &c., improperly called bannister.
BALUSTRADE.—A row of balusters set in a line with cap and base, serving as a railing or fence for altars, balconies, &c.
BANNISTER.—A corruption of baluster.
BAND.—Any flat member with small projection.
BASE.—The lower part of a column on which the shaft is placed; also the skirting board fastened to the wall just above the floor all round the room.

Batten.—A name given to a piece of board, from 2 to 4 or more inches wide, and about an inch thick, used to nail over joints in wider boards; also the cross pieces in a common door to which all the others are fastened and which holds the door together.

Batter.—The sloping backward of a wall, when it inclines toward you it is said to overhang.

Bead.—A molding whose cross section is semi-circular. When the section is three quarters round, the bead is said to be *returned*, because to form it the bead plane turned the other corner.

Beam.—A horizontal piece of timber, such as a tie beam in a roof truss; in New England floor joists are often called beams.

Bearing.—The span or length between the points of support of a beam or joist.

Bed Moldings.—The moldings between the corona and frieze.

Bevel.—A tool with an adjustable blade, which can be fixed at any angle by means of a screw; any edge but a square or molded one, is said to be a bevel.

Bits.—Those exchangeable boring tools for wood used with the brace.

Blind Nailing.—Nailing so that the nails do not show on the surface; narrow plank floors are so nailed, by driving the nails at the side joint just above the tongue.

Bond Timber.—Timber generally the thickness of a brick laid in the wall to tie it together; they should be used very sparingly.

Boss.—A head workman or employer, supposed to be derived from an ancient word signifying raised up, that is, above others.

Bottom Rail.—The lowest rail of a door or other framed work.

Box Frame.—Window frames in which the sash is hung by cords to counter weights in boxes on either side of the frame.

Box Head Frames.—Those in which the sash can slide up above the actual head opening of frame into thickness of wall; box head frames are often made when windows open out on porches and balconies to give head room to pass in and out.

Brace.—A kind of curved handle used for boring holes with bits. Also an inclined beam, bar, or strut used to stiffen the frame of a building or roof.

BRACKET.—A projecting piece of board, &c., frequently triangular; the vertical side attached to the wall, and the horizontal side supporting a shelf, &c.; often made in ornamental shapes.

BREAK.—Any projection from the general surface of a building.

BREAST SUMMER.—A beam of wood, iron, or stone supporting a wall over a door or other opening; a kind of lintel.

BRIDGING.—Short cross braces nailed in between the floor joists or beams to prevent their springing to and fro, and to stiffen the floors.

BRIDGING JOISTS.—Those extending from wall to wall, on which the floors are nailed.

CAMBER.—A slight upward curve given to a beam or truss to allow for its settlement, after it is in position.

DOUBLE HUNG.—A term applied to a window when both sashes are hung with weights and movable.

CANTILEVERS.—Pieces of wood framed into the front and sides of a house to sustain the eaves and moldings over them; also to support balconies.

CAPITAL.—The head or uppermost member belonging to a column or pilaster.

CARPENTRY.—The art of arranging the main timbers of an edifice.

CASEMENT.—Sashes hung on hinges.

CAVETTO.—A hollow molding whose profile is a quarter of a circle.

CENTERING.—The temporary wood work over which the masonry of on arch is formed.

CHAMBER.—Same as bevel.

CLAMP.—A piece fastened by tongue and groove transversely across the ends of others, to keep them from warping.

CLAP BOARDS.—Weather boards are sometimes called so.

CLAW.—The split at the end of an iron bar or hammer to take hold of the heads of nails or spikes for the purpose of drawing them out, as in the common claw hammer.

CLEAT.—A piece fastened to another to serve as a support for something else.

COLLAR BEAM.—A beam framed crosswise between two principal rafters, above the plates on which they pitch.

COLUMN.—A perpendicular cylindrical form, consisting of base, shaft and capital.

COMPOSITE ORDER.—The fifth order or style in Roman or classical architecture.

Corinthian Order.—The fourth order or style in Roman architecture; the third order in Grecian.

Cornice.—The ornamental projection at the top and eaves of a building or other construction, consisting of flat horizontal and perpendicular surfaces with moldings.

Corona (means crown).—The flat square and massy member of a cornice just below the O. G. or cymatium which constitutes the crown member of the cornice.

Crown.—The uppermost member of a cornice; called also corona.

Curtail Step.—The lower step in a flight, ending at its outer extremity in a scroll.

Cyma, Cymatium (means wave).—A molding hollow in the upper part and swelling below, when it is called *cyma recta;* if the upper part swells and the lower is hollow it is called *cyma reversa.*

Dado.—A plane used to cut grooves in boards at right angles to the grain of the wood; the groove itself is also called a dado; much used in neat shelving.

Dentils (means teeth).—Small square blocks or projections used in the bed moldings of the cornices in the Ionic, Corinthian and Composite orders.

Die.—The main body of a pedestal.

Dome.—The hemispherical or concave ceiling over a circular or polygonal building.

Door Frame.—The surrounding case into and out of which the door shuts and opens. It consists of twc upright pieces and a head, strongly fixed together, worked, rebated and beaded.

Doric Order.—One of the five orders of Roman architecture.

Dormer.—A window placed on the inclined plane of the roof, or against a Mansard roof above the main cornice, the window frame vertical.

Dovetail.—A joint described at page 34. A poor joint for timber where there is much strain, as it is apt to pull out.

Draught.—A drawing.

Drum.—The upright part of a cupola over the dome.

Eaves.—The margin or lower part of the slating or shingling hanging over the wall, thereby throwiug the water off from it.

Elbows.—The sides or flanks of any paneled work.

Entablature.—The assemblage of parts supported by column; it consists of architrave, freize and cornice, although

commonly the three parts are all included by the mechanic under the name of cornice.

FACADE.—The face or front of any building; the front elevation of a building is a facade.

FACIA.—A flat plain member in a cornice or elsewhere.

FILLET.—A small square member placed above or below the various square or curved members in an order.

FINIAL.—The ornamental top or finishing on a gable.

FINISHING.—A term applied to the joiner's work in the interior of a building.

FLASHING.—Pieces of tin or other metal let into joints to lap over gutters, &c., as about chimneys; the broad pieces of tin laid in the valleys of a slate or shingle roof are flashings.

FLUE.—The open aperture of a chimney inside from the fire place to top of shaft.

FOOTINGS.—The spreading course at the base or foundation of a wall.

FRAMING.—The rough timber work of a house.

FRIEZE.—The middle flat member of a cornice. The term is often applied where the architrave is absent.

FURNITURE.—The external metal or porcelain work of locks. knobs of doors, window fastenings, &c.

FURRINGS.—The thin pieces of wood required to bring out an irregular surface to a fair and straight face, as an uneven piece of wall, or a ceiling in which some of the joists are wider than others, or are bent and sagged.

FURRING (Fr. *Fourrer*, to thrust in).—To apply furrings as above.

GABLE.—The upright triangular piece of wall at each end of a roof, from the level of the eaves to the summit.

GAIN.—The beveled shoulder of a binding joist.

GIRDER.—The principal beam in a floor for supporting the binding joists.

GOUGE.—A chisel whose section is of semi-circular form.

GROUNDS.—Pieces of wood placed about openings, as doors or windows, so that when the walls are plastered the edge of the ground will be flush with the finished plaster; the wooden finishing can thus be attached to the grounds without injuring the plaster.

HALF ROUND.—A semi-circular molding.

HEADER.—The beam which heads the other floor joists at a stairway, or other opening in the floor. It is generally hung by stirrup irons to a trimmer at each end, and both headers

and trimmers should be double the thickness of the other floor joists.

HEADING JOIST.—A joint at right angles to grain of wood; the end joints of each plank against the next in length in a floor are heading joints.

HEADWAY.—The clear distance between the top of a step to the under side of the ceiling, under the trimmer beam; should always be 8 feet at least.

HIP ROOF.—One that slopes four ways, thus forming angles called hips.

IMPOST.—The capital of a pilaster supporting an arch.

IONIC.—One of the orders of classical architecture.

JACK RAFTER.—A timber shorter than the whole length of other rafters in the same range.

JACK SCREW.—A portable machine for raising great weights by the agency of a screw.

JAMBS.—The sides of an opening through the wall, as door, window and fire-place jambs.

JOISTS.—The timbers to which the plank for a floor, or the lath for ceiling are nailed.

KERF.—The opening or narrow slit made by sawing.

KEY.—A piece of wood let into the back of another in the contrary direction from the grain to prevent it from warping.

KING POST.—The middle post of a framed truss for supporting the tie beam at the middle and the lower ends of the struts.

LATH.—A narrow slip of wood, 1¼ to 1½ wide, ¼ to ⅜ in. thick, and 4 ft. long, used in plastering.

LEVEL.—A horizontal surface; a surface which inclines to neither side.

LINTEL.—A piece of timber, iron, or stone placed horizontally over a door, window or other opening.

MANTEL.—The work over and at the side of a fire-place in front of chimney, especially a narrow shelf on top.

MEZZANINE.—A low story introduced between two principal stories.

MITER.—A joint formed along the diagonal line where the ends of two pieces are united at an angle with each other.

MODILLION.—An ornament in the entablature of the richer orders resembling a bracket.

MORTISE.—A hole cut in one piece for receiving the tenon which projects from another piece.

MULLION.—The upright bar which divides a window into several lights.

Newel Post.—The post, plain or ornamental, placed at the first or lowest step, to receive or start the hand rail upon.

Nosing of Steps.—The rounded projecting edges of the treads of the steps.

Ogee or Ogive.—The same as Cyma, which see.

Order.—An assemblage of parts, consisting of a base, shaft, capital, architrave, frieze and cornice; these parts are all proportioned to each other; the unit of measure being the lower diameter of shaft. There are five orders of classical architecture, namely Tuscan, Doric, Ionic, Corinthian and Composite, the proper understanding and application of which constitute the foundation of excellence in that art.

Out of Wind, (pronounced *wynd*).—Perfectly straight or flat.

Ovolo.—A projecting convex molding of quarter of a circle, a quarter round.

Panel.—A thin piece of wood framed or received in a groove between two upright pieces or stiles and two transverse pieces or rails. Any sunk or recessed space in a plane surface.

Panel Saw.—A saw made for cutting very thin wood; the blade is about 26 in. long, and it has 6 teeth to the inch.

Parget.—The plastering used for coating the internal surface of chimneys.

Parting Strip.—The strip inserted in the center of the pulley stile of a window to keep apart the upper and lower sashes.

Pedestal.—An insulated basement or support for a column, statue or vase; it usually consists of the three parts, base, die and cornice.

Pediment.—The low triangular crowning ornament of the front of a building, or of a door, window or niche.

Perch.—A measure of stone wall, correctly 23¾ cubic feet of wall, but in many parts of the country masons call 16½ cubic feet of wall a perch.

Pilaster.—A square column projecting from the face of a wall; an antea.

Piles.—Large timbers pointed at the end and driven in the earth to make a foundation to build on in soft ground; improperly called spiles.

Pillar.—A pier or support of irregular form, the proportions of which are not subject to the rules of classic architecture; hence the distinction between a pillar and a column.

Pitch of a Roof.—The inclination which the sloping sides

make with the level of the wall plates ; when a roof is half pitch, the hight of the top of the gable or ridge from the wall plate is half the width of the building ; when it is a third pitch it is one third, &c.

PLAN.—A draught or representation on paper of any projected work.

PLANCEER.—The under surface of the corona in the cornice; also a soffit, which see.

PLANTED.—A projecting member worked on a separate piece of stuff, and afterward fixed in its place, is said to be planted, as a planted molding.

PLATE.—A horizontal piece of timber in a wall, generally flush with the inside face thereof, for the reception of the ends of beams, joists or rafters.

PLINTH.—The square solid serving as base of a column, pedestal or wall.

PLOW.—A carpenter's grooving tool.

PLUMB.—Perpendicular, that is, standing according to a plumb line.

PRINCIPALS OR PRINCIPAL RAFTERS.—Those which are larger than the common rafters, and which are framed at their lower ends into the tie beam, and at their upper ends are either united at the king post, or made to bear against the ends of the straining beams where queen posts are used. The principals support the purlins which again carry the common rafters, and thus the whole weight of the roof is sustained by the principals. Principals are only used in roofs of large buildings where it is desired to have a clear open space without columns, as in churches, public halls or theaters.

PROFILE.—The outline or contour of anything, such as a building, figure, or molding.

PROJECTION.—The jutting out of certain parts of a building beyond the face of the wall, as the projection of a cornice, &c.

PULLEY STILES.—The stile or side of window frame in which the pulleys are fixed.

PURLIN.—A piece of timber laid horizontally resting on the principals of a roof to support the common rafters.

RABBET.—See Rebate.

RAFTERS.—Inclined timbers in sides of a roof.

RAILS.—The horizontal piece in framed work which receives the upper and lower edges of the panels.

RAKE.—Slope or inclination.

RAMP.—A concave bend in the capping of a piece of work ; thus in stairs it is that concavity which occurs over risers, or

over a half or quarter space by the sudden rise of the steps.

REBATE.—A square channel or recess sunk in the edge of a board.

RETURN BEAD.—One which shows the same appearance on the face and edge of a piece of stuff, forming a double quirk.

ROOF.—The cover of a building irrespective of the material of which it is composed.

SAP WOOD.—The external part of the wood, that part last formed between the bark and the solid matter. For building purposes the sap wood should be removed from timber and lumber, as it decays more quickly than the other, and in finished work stains through and discolors the paint.

SASH.—The framed part of a window in which the glass is fixed.

SASH FRAME.—The frame in which the sash runs up and down, or to which it is hinged. When the sash is hung, the frame is made hollow to contain the balancing weights, and is said to be a box frame.

SASH CORD.—The line by which the sash is suspended to the balancing weight.

SCANTLING.—A general name for small timbers, such as the quarterings for a partition, rafters, purlins or pole plates in a roof.

SCOTIA.—A hollow molding.

SCRIBE.—To mark so as to fit one piece to another.

SCUTCHEON.—The ornamental bit of metal or porcelain with key hole in it, placed over the key hole in the door, &c.

SECTION.—The representation of a building supposed to be cut open from top to bottom, showing the hight of the stories, thickness of walls, floors and timbers, and the construction of the roof; also the arches, domes, &c.

SHAFT.—The body of a column between the base and capital.

SHAKE.—Fissures or rents in timber caused by the bending over of the trees in heavy gales of wind, by which the fibers are torn apart and slide on each other.

SHELL BIT.—A boring tool, shaped like a gouge, used with the brace in boring wood; it removes the wood almost as a solid core.

SHOOT.—To plane straight, or fit by planing as to shoot a joint.

SHORE.—A piece of timber placed so as to prop up a wall or other body.

SILL.—The horizontal piece of timber at the bottom of a

house frame, which rests on the piers or foundations and supports the wall studs and floor joists. Also the bottom piece in a window or door frame.

Single Hung.—Applied to a window with two sash when one only is movable.

Site.—The position or seat of a building; the place where it stands.

Skirting.—Base board; the board placed about the room against the wall, just above the floor.

Sleepers.—Pieces of timber laid in the ground in cellars, &c., on which to fasten floor plank.

Soffit.—The under side of a lintel; the ceiling of an opening, as a door or window; also the under horizontal surface of an architrave between columns, and the under surface of the corona of a cornice.

Span.—The width between the supports of a row or arch is said to be its *span*.

Specification.—A statement of particulars, describing the manner of executing any work about to be undertaken, and the quality, dimensions and peculiarities of the materials to be used.

Spiles.—See Piles.

Splay.—A sloped surface, or a surface which make an oblique angle with another; as when the opening for a door or window widens in toward the room it is said to be a splayed opening. A large chamfer is called a splay.

Spoke Shave.—A sort of small plane used for dressing the spokes of wheels, and other curved work, where the common plane cannot be applied.

Spoon Bit.—A hollow bit with a taper point for boring wood.

Springer.—The point where the upright support of an arch terminates and the curve begins.

Square.—A work is said to be square framed or framed square, when the framing has all the angles of its stiles, rails, and mountings square without being molded.

Standard.—Any upright framing.

Step.—The tread and riser taken together from one step; the tread is the top of the step, the riser the front.

Sticking.—The operation of forming moldings by the plane, in distinction from carving them out by hand with the gouge or chisel.

Stock and Bit.—See Brace.

Stops.—Pieces of wood nailed on the frame of a door when the frame has no rebate worked in the jambs to form

the recess or rebate into which the door shuts; also pieces fastened in base boards behind doors to keep the knobs from touching and injuring the plaster when the door is opened wide.

STORY.—A stage or floor of a building. The distance from the top of one floor to the top of the one above.

STRING.—The boards or plank under and supporting stairs, sometimes cut out to receive the steps and risers; in which case they are open strings; when the steps and risers are let into the strings, they are said to be housed in the strings, and the latter are then called *close strings.*

STRIB MORTISE.—One which does not pass through the whole thickness of the material.

STUCK MOLDINGS.—Those formed by planes instead of being wrought out by hand.

STUDS.—The timbers used in lath and plaster partitions and walls, and placed either 12 or 16 inches apart, as it is desired that a lath which is 4 feet long may have 4 or 5 nailings in its length; studs may be of various sizes from 2 × 4 to 4 × 6.

SUMMER.—A lintel, a girder.

SURBASE.—The crowning molding or cornice of a pedestal; the moldings immediately above the base of a room.

TAIL TRIMMER.—A trimmer next to the wall into which the ends of joists are fastened to avoid flues.

TEMPLET.—A pattern used by joiners to cut miters by on small beads, &c.

TENON.—The end of a piece of wood which is cut in a square shape and is received into a cavity in another piece of wood.

TIE-BEAM.—The beam which connects the feet of a pair of principal rafters in a roof, and prevents them from thrusting out the wall.

TIMBER.—That sort of wood which is squared or capable of being squared, and fit to be employed in house building and carpentry.

TOP RAIL.—The highest rail in a piece of framing.

TORUS.—A large molding with semi-circular section; differs from astragal in being larger.

TRANSOM.—The bar separating the door from the fanlight above it.

TRANSOM-SASH.—A fanlight.

TREAD.—The horizontal surface of a step.

TRIMMING-JOISTS.—The joists thicker than the other joists, into which the trimmer is framed.

TRUSS.—An arrangement of timber and iron so combined as to make an unyielding frame ; so named because it is trussed or tied together. See Roof.

TUSCAN.—The first and simplest of the five orders of Roman or classical architecture.

VALLEY-RAFTER.—The rafter in the re-entrant angle of a roof.

VENEER.—A facing of thin wood, generally a superior wood laid over a common material.

VERANDA.—An open portico or light external gallery, with sloping roof, supported on slender pillars.

WAINSCOT.—The wood work lining the sides of the room, generally from 2 to 6 feet high, with molded capping ; often paneled.

WASH-BOARD.—The base board about a room.

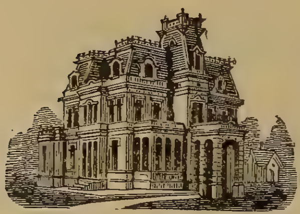
WEATHER-BOARDING.—Boards nailed to the wall studs on the outside of a wooden house, with a lap on each other to prevent the penetration of rain and snow.

WELL-HOLE.—In a flight of stairs, the space left in the middle beyond the end of the steps.

WIND (pronounced *wynde*).—To cast or warp ; to turn or twist any surface, so that all its parts do not lie in the same plane.

WINDERS.—Those steps of a stair which, radiating from a center, are narrower at one end than the other.

WING.—A small part or building attached to the side of the main edifice.



PAINTING

IN ITS VARIOUS BRANCHES.

THE EVILS OF PAINTING, AND THEIR REMEDY.

It has been said, and with much truth, too, that "House-painting might, with study, and acquirement of correct taste and more extensive information, resume its rank as a liberal art." There is no reason why it should not. It is an art, and should be recognized as such, and will be when the painter shall have sufficient interest to do something more for its elevation. It is at a low ebb at present; for, while the various other branches of the fine arts have their elaborate volumes of refereuce, and Art Journals of deep research and investigation, and latest discoveries and improvements, for the benefit of their artists, the house and sign painter and the grainer are left to their own resources, to catch what they may by individual experiment and the careful observation of their own mistakes.

Though America may boast of many excellent painters, who may not be excelled on the earth, yet they are almost lost amid the vast multitude of ordinary, indifferent, and miserable ones. The long apprenticeship and practice of the former seem almost thrown away, for they stand a very little better chance, in the aggregate of success, than others who have spent little or no time in the study of the business. A poor workman can and will work cheaper than a good one; and, consequently, competition comes into ver-

vice, and the finished workmen are obliged to learn their trade more thoroughly, that is, learn the art of *slighting*, before they are able to cope with their competitors, and obtain, like them, an honest living. This spirit is caught up by the employer, and, in the rage to get everything cheap in this go-ahead age, the lowest bidder, without regard to quality, too often gets the job; so, many good and poor workmen naturally fall into that uncertain and unsubstantial manner of doing work that characterizes all the sham, slop-shop works of decorative art. It must not be understood, however, that these remarks have only a limited reference, for there are both painters and employers who well understand these practices, and whose correct taste — and liberal pockets — keep them mindful of the purity of the art of decoration. And, in justice to the inferior workmen, it may be remarked that it is not so much a fault with them as it is a want of facilities for learning. There are no published books of any utility; and then painters are very chary of their knowledge, and do not like to impart it too freely.

There should be a remedy for this evil, and there can be. Painters should be more communicative, and not be so tenacious of whatever superior method they may have acquired or discovered. It is quite a mistaken idea that one's business would be injured by discovering the secret of a superior method to his brother painter. If all this secret knowledge was more generally diffused among the craft, the benefit would be mutual. Knowledge should not be monopolized, but should be imparted to all alike, and all alike would be benefited. A better style of work would be the result of such a reciprocity, and better prices would be realized (which is a feature devoutly to be wished by a class of painters, who, as a whole, are no more than half paid for their labor, in a vocation so deleterious to health). It would require more time and labor, and just as many hands be employed, and the trade would then be worth learning.

However, one is not to blame, if he has made any discovery which has cost him time and money, should he wish to keep it a secret, or patent it, until he can make his money out of it; yet, in all minor matters, it is not only neighborly to instruct one another, but is really an honor to the craft.

The art of painting, in all its various branches, is, perhaps, under present regulations, quite as injurious to health as almost any other branch of mechanical business, especially house and general shop-painting.

It is supposed that painters, in the aggregate, pay an interest on their life of about twenty-four per cent.; that is, they shorten their lives about two months every year for the privilege of following the noxious business, and getting a taste of the colic every other moon. In fact, it is statistically true that the average lives of painters do not come up to the average standard of longevity.

It is well known that painting is an unhealthy business and to such an extent is this prejudice abroad, that it is with difficulty, in some places, that master workmen can procure an apprentice.

The house-painter is much more exposed, and liable to the poisonous effects of colors, than those who follow other branches, on account of the large quantities of vapor exhaled from lead and the arsenious greens, especially that most brilliant but deadly color, emerald green. This poisonous color, as all arsenious preparations will, gives out exceedingly large quantities of vapor, the inhalation of which will very suddenly show itself, and is quite often mistaken for some other disease, and frequently, by physicians, so treated. It causes inflammation of the throat and lungs, and produces, in different parts of the body, small watery pustules, which are exceedingly troublesome. We have known painters to be so afflicted with this affection upon

their breast, groins, and armpits, that they were unable, for several days together, to move a limb without great inconvenience and pain.

In England, where much more of this green is used, it has been ascertained from actual observation, and the experience of physicians and other scientific men, that a series of diseases the most complicated have resulted from having the walls of houses washed, painted, or papered with arsenious greens. Cases have been known where whole families have been poisoned by living within the walls of such houses.

Copper, arsenic, and lead are exceedingly volatile, and those persons immured within the walls covered with them are so perfectly enveloped with the vapor arising therefrom that they are continually inhaling it, greatly to their detriment.

A very singular case (and a remarkable and unmistakable evidence of the noxious effects of arsenious vapor) occurred in England a few years ago. A family, a short time after moving into a certain house, were taken suddenly and violently sick. A physician was sent for, who pronounced it a case of poisoning from arsenic. The patients were relieved, but lingered on for some time, and, finding they did not recover their health, left the building. Another family moved into the tenement, and were attacked in like manner; still other persons occupied the rooms, and the same results followed, until, at last, it was alleged that the house was haunted, and Madam Rumor set about making up the legends. But science eventually got hold of the matter, when, by investigation, the premises were known to have formerly been occupied by painters, who were accordingly called upon, when it was ascertained that previous to leaving the house they had buried a large quantity of refuse arsenic three feet deep, in the bottom

of the cellar. The deadly drug was removed, and people were no longer haunted with this arsenious ghost.

Almost every painter is familiar with the noxious effects of lead, especially when cooped up in a close room, with *drawn flatting*, and perhaps the keyholes stopped up. Few there are who can work three hours thus, who will not, on coming to the fresh air, almost immediately fall, or stagger as though they had imbibed something of a different nature from turpentine. This part of the business will soon produce the painter's colic, and eventually paralyze, unless much care be taken to guard against it.

In England, benefit has been experienced in cases of painter's or lead colic, both by those who manufacture and those who use white lead, in the use of sulphuric acid in very small quantities. One way of using it is to put one dram of acid into ten pints of table or spruce beer, or mild ale; to shake it up well, and allow it to stand a few hours. A tumbler-full twice or three times a day is used. Another way, not so convenient, is to make the beer as follows: Take of molasses, 14 pounds; bruised ginger, ½ pound; coriander seed, ½ ounce; capsicum and cloves, ¼ ounce each; water, 12½ gallons; yeast, 1 pint. Put the yeast in last, and let it ferment. When the fermentation has nearly ceased, add 1½ ounces of oil vitriol mixed with 12 ounces of water, and 1½ ounces bi-carbonate of soda dissolved in water. Fit to drink in three or four days.

The painter is often asked what the painter's colic feels like. He could not, probably, describe it better than to say to those who do not wish to try the experiment, that if the strands of a rope, while being twisted together, should be passed through the bowels horizontally, and the whole abdominal viscera be twisted with it, a faint idea might be formed of the lead colic.

Cleanliness.

The painter, in general, pays quite too little care and attention to personal cleanliness, and, thereby, to his health. One will frequently work for half a day with flatting, daub and spatter himself till he looks as though some one had been practising granite on him, and when noon comes, without washing, sit down in the same room where he has been working and eat a *cold dinner*, highly seasoned with carbonate of lead and turpentine! It is no wonder they are sick. Can any one imagine a reason why they should not be?

A journeyman house-painter of Boston, who was subject to attacks of the colic, applied to a celebrated physician of that city in the hopes of obtaining an antidote, or at least a preventive of this complaint. The doctor ordered him to pay particular attention to washing his face and hands, and rinsing his mouth before eating, change of clothing, &c. This course the painter adopted; but it lasted only while the memory of the colic pains was fresh in his mind. In the course of a year the order was forgotten, and he backslid from his cleanliness, until he slid his back upon the bed. The doctor was again called, prescribed again, which was followed by the same practice and the same results, and the painter was once more brought to bed, from which he rose not again.

A few years ago there was a painter in Cincinnati who was so used up from the effects of lead and abuse, that he was unable, sometimes for eighteen months, to walk; and during his best days he waddled along with such an uncertain, ungainly motion, that it was difficult to tell whether he was walking backwards or forwards; in fact, he seemed to be trying to do both at the same time.

Now the fault lay chiefly with himself. He was in the

habit of "spreeing" pretty often, and he confessed that he had worked, with flatting, for three successive weeks with no other nourishment than what few crackers he took to "wash down the whiskey," slept in the paint-shop, and did not wash his hands during the whole time. The greatest wonder is that he could live in any shape.

The above is no guess-work, but the cases are *bona fide* ones, and very remarkable, and we are happy to say *rare* cases of neglect and uncleanness among painters; yet we cannot help thinking that they suggest the idea that soap and water are cheap and convenient, and are worth more than all the pills and powders in Christendom.

Another great source of trouble is, suffering the color to accumulate under the finger-nails, and there remain till it is dry, and rattles out into the food, and thence into the stomach. Now an occasional dose of this might, perhaps, on the homœopathic principle of infinitesimality, drive out of the system the accumulated lead; but the mischief of it is, if the principle is homœopathic, the doses are allopathic; and as these two systems are at loggerheads at present, it is not prudent that the painter should attempt in this manner to harmonize them.

It is a very easy matter to preserve the clothes, and thereby in a great measure the health. It should be a part of the trade, which, when once learned, is just as easy to practise as it is to swing the brush; and if the master painters would have an eye to this, they would not only find it an advantage to themselves, but a great blessing to their apprentices. It is true that some are born with a natural taste for the art — for neatness is an art — and some have to acquire it; but it can be acquired, and should be, just as much as any part of the trade.

These may be considered small matters to write about; but let the *old* painter, if such a being can be found, look

back at the past, and he will tell you they are *great* matters.

Those painters who are confined to shops are fully as liable to paint-poison, though of a different nature, as they deal more largely in dry colors. And here, again, another error presents itself. Their shops are usually poorly ventilated, being oftentimes in cellars and basements, from which the vapors scarcely have a chance to escape, and thus the individual is continually inhaling the poisons arising from the everlasting messes of colors, and the newly-painted work; also by grinding and mixing.

Now the most of these troubles of the shop workmen can be avoided. In the first place, the shop should be well ventilated. It can easily be done by partitioning off a small room, or cupboard, for the keeping of all the colors, dry and mixed, from which, as well as the room occupied, a pipe or conductor should extend to the open air. The best ventilator is the *Air Siphon*, a late scientific discovery. It consists of an inverted siphon, which may be a tube of tin, wood, or other material, or a stove-pipe, six inches in diameter, made in the shape of a semicircle, or like the rounded elbow of a stove-pipe; the legs of it should be from twelve to twenty inches in length. This should be inserted in the chimney, with the two open ends up, the chimney answering for the longer leg of the siphon. All foul or vitiated air very rapidly escapes through this, thereby very thoroughly ventilating the apartment. This air siphon is highly useful for ventilation, and should everywhere be adopted.

In regard to inhaling the dust from grinding the dry colors, it is probably quite as cheap, if the time is considered, to use the colors which come ready ground in tubes.

It should be well understood that most mineral colors, when mixed with oil, turpentine, or any fatty matter, throw

off exceedingly large quantities of vapor, which, being inhaled and passing into the lungs, is forced through the capillaries into every part of the system, giving rise to many unpleasant and dangerous disorders. A portion, too, is absorbed by the skin, but this cannot so well be avoided; the practical neglect and carelessness, however, can. The former Nature can combat with and recover from, but the additional force of the latter, with all its retinue of auxiliaries, is too much, and the victim to carelessness is, sooner or later, overcome, and forced to yield to superior power, and finally drops into his grave, or remains a cripple, and hobbles around in its immediate vicinity.

We shall now close this division by recommending

A few Rules to be observed.

Avoid spattering, for it is unpleasant as well as dangerous to be continually enveloped in robes of poisonous paint.

Never attempt to eat or sleep without first washing the hands and face and rinsing the mouth.

Wash the whole surface of the body at least once a week, with soft water.

Keep the buckets, brushes, &c., clean, so that they may be handled without smearing the hands.

Every painter should wear overalls, or change his clothing throughout once a week at least, in the mean time thoroughly airing those he has thrown off.

Keep the shops clean and well ventilated.

Never sleep in a paint-shop, nor in a newly-painted room, nor paint the walls of a room with any of the metallic greens.

Never suffer the paint to accumulate upon the clothing, nor under the finger nails.

Never wash the hands in turpentine, as it relaxes the

muscles and injures the joints. Any animal oil, or even linseed oil, is better.

Never drink water that has stood any length of time in a paint-shop, or in a newly-painted room.

Never use spirituous liquors (except prescribed by a physician), especially when ailing from the effect of paint, as it unites with the mineral salts and tends to harden them, and causes inflammation of the parts where they concrete.

Milk, sweet oil, and the like, should be used freely, as they tend to soften the accumulated poisons, and carry them off.

Vinegar and acid fruits, used constantly, unite with the lead that may be in the stomach, chemically changing it to the acetate, or sugar of lead, which is by far the least dangerous. Acetate of lead is scarcely recognized, in medical jurisprudence, as a poison.

Avoid breathing the dust when emptying papers of dry colors.

Make your smalts where there is a current of air; and, while stirring, stand to the windward, that you may not inhale the smoke.

ANALYSIS OF COLORS.

There are several of the metals, the salts of which form a good material for painting; but that most extensively used in the arts is lead.

WHITE.

Nearly all whites have their base in the oxides and carbonates of different metals.

White Lead is a carbonate of lead, prepared by submitting common lead to the action of acetic acid, or vinegar, at a high temperature. It is poisonous, especially when combined with oils or fatty matter.

The chief adulterations are barytes, whiting, and silicate of potash.

Carbonate of Barytes is less poisonous than lead; it is certainly not as valuable, and has very little body, though it is whiter, and when combined with lead in proper proportions, makes a very good white, and does not injure the lead for ordinary purposes. The sulphate of barytes is often used in the cheaper leads, but is an inferior article.

Zinc White is an oxide of zinc. It is a durable and beautiful white, besides being harmless. All the very best and finest work in the cities is now finished with zinc. It has less body than lead, but is vastly whiter and more durable,

and does not, like lead, turn yellow when excluded from the light and air.

CHINA WHITE is lead that has been elutriated, or washed, thereby freeing it from all impurities.

WHITING is well known to all. It is a carbonate of lime. It is of no utility as a paint, as it will become spotted, and rubs off after the oil is evaporated. It is properly fit for putty, and various room washes.

PEARL WHITE is generally used for the finer and more delicate branches of painting. It is a submuriate of bismuth.

KREMLITZ WHITE is a superior quality of lead. There is little in the market at present, as the extensive manufactories at Krems have been abandoned. All German leads are considered the best, as their ores contain less iron.

SILVER WHITE is also a lead prepared by elutriating. It is the best of the tube colors for general use.

There are various other whites, mostly manufactured in Germany.

VENICE WHITE is a mixture of equal parts of sulphate of barytes and lead.

HAMBURG WHITE is two parts of barytes and one of lead.

DUTCH WHITE, three parts of barytes and one of lead.

It will be perceived that these mixtures are of little utility to the painter.

YELLOWS.

Yellows have their bases in iron, lead, quicksilver, and arsenic.

CHROME YELLOW. The best is made from chromium and acetate, or the nitrate of lead, and is properly a chromate

of lead. An inferior article is prepared with whiting. The best now in use for general painting has its base in silicate of potash and barytes.

GAMBOGE is the concrete juice of various trees in Ceylon. It is a transparent color, and consequently useful as a glazing color.

YELLOW OCHRE is an earth. The best comes from France.

STONE OCHRE is also an earth, found in many parts of Europe.

NAPLES YELLOW is an earth found near Naples, but most of that now in the market is composed of lead, alum, sal-ammonia, and antimony. It is a soft, bright, and durable color.

TURNER'S YELLOW, a muriate of lead. This is a beautiful tint, and has formerly been much used among coach-painters.

REDS.

Reds have their bases in iron mostly, and some have supposed that all reds are dependent upon the presence of iron for their color.

CARMINE is kaolin, or China clay, colored with cochineal, and, being prepared with much difficulty, it is very expensive. A common article is composed of alum and cream of tartar, colored with cochineal.

This color fades rapidly on exposure to the sun, and is of little use in out-door work. It is a rich, transparent color.

VERMILION is composed of sulphur and quicksilver. The first quality, at present, comes from France, it being difficult to get Chinese vermilion that is free from pulverized glass; in fact, the greater portion of the Chinese vermilion

now in the market is almost worthless in consequence of this adulteration. The English and American vermilions are cheaper, and inferior in *color* rather than quantity.

CHROME RED, or American vermilion, as it is sometimes called, though not so fine a color when first used, is much cheaper than vermilion; being one fifth the price; it stands exposure much better, retaining its hue long after the best Chinese has turned brown. For this reason it is much better adapted to all out-door painting. Its composition is saltpetre and chrome yellow, produced by a process of heating and washing.

ROSE PINK is nothing more than whiting, tinctured with Brazil wood, and is of little service in out-door painting, as it immediately fades on exposure to light. It is cheap, and being transparent, does very well for a glaze for chairs or other furniture.

RED LEAD, or red oxide of lead, is of more use in boiling in oil to make it dry than anything else. It is not much used among painters on account of its fading quality, though it is used in some compound mixtures. With chrome yellow, it makes a rich ground for mahogany. It is a durable color, and is therefore preferred by wheelwrights for painting wagons.

MADDER LAKE is the only lake that does not fade. A fine, transparent glaze for beautiful and delicate work, but too expensive for common work. Its composition is alum and soda, or silicate of potash, or kaolin colored with madder.

VENETIAN RED is an earth, found in various parts of the world. It is the principal body used for all common purposes.

BLUES.

Copper is the base of most blues, though some are formed from iron and cobalt.

PRUSSIAN BLUE is properly a ferrocyanuret of iron, produced by various processes. As a vehicle, dried or calcined blood and horns and hoofs are used.

There are other methods, where animal matter is not used, in which pearlash, coke, and iron-filings form the compound. It is also chemically prepared with sulphate of iron and prussiate of potash; but in all these preparations the composition is iron and prussic acid. The prussic acid, however, is not in sufficient quantity to make the color in the least degree poisonous.

ULTRAMARINE. This beautiful blue was formerly made from lazulite, the beautiful variegated blue mineral, and was once worth, in Italy, twenty-five dollars an ounce. That used in the arts now is composed of carbonate of soda, sulphur, and kaolin, colored with cobalt.

This color has but little body as an oil color, but is of a most brilliant hue, and wears about as well as the Prussian blue. In oil it is a transparent color, but is more dense in distemper, and covers better.

GREENS.

All mineral greens have their bases in copper, and some of them contain arsenic.

BRUNSWICK OR BREMEN GREEN is a compound of carbonate of copper and chalk, and the best has a portion of lead.

This is a fine, lasting green, and is much more neglected

than it should be. It is less poisonous than most greens, as it contains little or no arsenic. When used alone, it is of too blue a cast, but being lightened up with light chrome, or lemon chrome yellow, it makes a green almost equal to emerald, both in brilliancy and durability, and has a softer, pleasanter tone. An equal quantity of emerald mixed with it increases its brilliancy.

Scheele's Green is composed of acetate of copper and arseniate of potash. It is very poisonous, without being redeemed by beauty or durability.

Emerald Green. This intensely brilliant color is a compound of yellow arsenic and verdigris, and consequently the most deadly poison with which painters have to deal. Some years ago, when verdigris was in vogue, painters complained of the deleterious effect of that miserable color but they may now well find fault when they are obliged to stand the ravages of the combined force of that and arsenic also. It was first discovered and manufactured in France, and has only been in use a few years, and it is to be hoped that its future existence will be as brief as its past; for its effects upon the people who have their rooms painted, washed, and papered with it are almost as bad as upon the painter who uses it.

Chrome Green was formerly made from the blue oxide of chromium, but that which is now mostly in use is a compound of potash, sulphur, and chromic acid. Some factories, however, are now preparing it from the chemical Prussian blue and chrome yellow.

This is a very soft, rich, and durable color, but in the rage for the glaring emerald, it has been much overlooked.

BROWNS.

Browns generally depend upon iron for their grades of tint.

UMBER is an earth found in Turkey and the Island of Cyprus. Both in its raw and burnt state it forms one of the best body browns we have. It is a valuable article in graining oak and black-walnut.

TERRA DE SIENNA, as its name indicates, is an earth found in the neighborhood of Sienna, Italy. Raw and burnt, it is a rich, transparent color. The raw makes a good grain color for maple and satin-wood, the burnt for mahogany, and both are good colors for glazing, and for shading on gold.

These are the browns mostly in use, though VANDYKE BROWN is useful in graining the darker woods; yet Terra de Sienna, umber, and ivory black are sufficient for all common purposes.

MINERAL BROWN is made by mixing equal parts, in water, of sulphate of copper and prussiate of potash, and then evaporating the water. It is a bright, yellowish transparent brown, similar to raw Sienna.

SPANISH BROWN is a miserable, dull color, and not of much utility.

BLACKS.

LAMP BLACK is merely the smoke from various substances. The best is from coal tar. This is the best black for all common painting.

IVORY BLACK, or bone black, is only charred bone. It has not the body, nor does it work as freely as lamp black.

DROP BLACK. Either of the above may be washed, or

elutriated, and then dried in drops. It is the purest form, and useful in the finer portions of painting.

Asphaltum, although so very transparent, is, when several coats are laid on, a most intense black, but not of much service when exposed to the weather. It is best used dissolved in turpentine, slightly warm, with or without a little boiled oil. Without the oil, it dries very quick; with it, much slower. It makes the black varnish used for japanning tin and other metals. Gum asphaltum is gathered from the surface of the Dead Sea, or the Lake Asphaltites, in Judea.

Remarks. — The best colors are generally the cheapest. The best test is comparison. Look at the best and the poorest: the difference will be manifest.

SMALTS.

The glass smalts are made by grinding glass that contains some mineral coloring matter.

Blue Smalt is ground glass, colored with cobalt in the furnace.

Green Smalt. There are no green smalts manufactured which are of much use. A bright green smalt may be made by heating white sand almost to a red heat, and then putting in, while hot, equal parts of emerald and Brunswick green, mixed with boiled oil and a little turpentine. A sufficient quantity of color must be used to color the sand a rich green. It should be stirred till nearly dry, and then spread out for drying, with occasional stirring till it is quite dry and well separated, and then sifted. Much care should be observed in doing this, as the arsenic and copper contained in the green will play the mischief with one's throat and lungs. It is best to be in a draught of air, and stand to the windward.

Red Smalt can only be obtained by the same process as above, using chrome red for coloring. The sand must not be heated so hot as for green. The sand for both of these smalts should be pure and white.

Brown Smalt. A rather poor article comes in the shape of ground glass, but a better article may be made as above, using vandyke, or any of the browns, to color with, changing the tone to suit the fancy, with chrome or venetian red.

Black Smalt. The common black sand answers well, and is much used for smalting. It is, however, a dark gray If required to be a jet black, it may be made as above, using lampblack to color the sand.

Frosting. Glass blown very thin, and then crumbled fine, gives a beautiful, sparkling, diamonded appearance to smalted grounds. The white frost is the best, and may be obtained at the glass factory, and sometimes at the drug stores.

Flock is the fine shearing of colored woolen cloths. It is greatly superior to any smalt, especially for in-door work, and has latterly almost superseded all other finishes for sizing, &c. Almost any grade of color or tint may be obtained, yet the black is the most durable.

Remarks.—Much care should be used in making these smalts, by keeping them well stirred during the heating, and after they are spread out to dry, or they will be apt to dry in lumps. The best way is, after it is cold, to run it through a coarse sieve. Where any quantity of it is made, it should not be packed away for a few days.

Black smalt will keep almost any length of time, but the colored smalts will be more apt to fade and grow dull These latter should be kept from the light and air as much as possible.

DRYERS.

Japan Varnish, made with gum shellac, umber, red lead, litharge, sugar of lead, white vitriol, manganese, and patent dryers which have their base in the above, are all good dryers. Some drying quality, also, has been imputed to the onion when boiled in linseed oil. There may be some truth in it, though we have never found it of any value. The idea has probably grown out of the fact that some persons used to immerse an onion in the kettle of oil while boiling, as a test. The oil, when sufficiently boiled, would scorch the onion.

OILS.

Although many vegetable oils have been introduced to the consideration of the painter, yet Linseed Oil still holds the preëminence for general painting.

Hemp-Seed Oil, Corn Oil, Sunflower-Seed Oil, have all been well tested, and some of them work very well; yet they are not in much favor. They do not generally dry as fast, and are not so white, nor are they much if any cheaper than linseed oil.

Turpentine is the only oil vehicle that admits of the white lead retaining its purity of tint; hence it is adapted to painting white, where the work is excluded from the light and air.

Boiled Oil. The best method of boiling oil is to bring the oil to the boiling point, and then add from one half to a whole pound of litharge, or red lead, or umber, either one or all, recollecting that the more of these dryers that are added, the *darker* and more drying the oil will be.

Where a clear, transparent oil is required, add only sulphate of zinc. The tests for knowing when the oil is sufficiently boiled are, it will scorch a feather; it looks brown; it will crackle if a drop of water be thrown in; but the main thing is to cook it till the froth is all burned off. All these indications, however, will be seen about the same time.

Oil of Lavender, as it dries very even, is useful where a hard, enamelled surface is required.

Oil of Poppy is very slow to dry, but being colorless, is useful in mixing white and delicate tints. Sugar of lead or sulphate of zinc will dry it.

Nut Oil is clearer, but more costly than linseed oil; yet is prepared by artists for picture work.

MISCELLANEOUS.

Lime Water. This great secret, called also *Harry Miraculous*, has been sold by travelling speculators for five, ten, and twenty dollars. Contrary to the humbugs usually peddled, this is a very valuable item.

Equal parts of lime water and linseed oil, which will mix if well shaken, when united with any body matter, particularly lead, form a solid and almost imperishable cement, which, for priming and second coating, or even the last coat, is far superior to oil paint; and the painter who supposed he was cheating his employer, was actually benefiting him. The color, however, works badly, as it is thick, light, and creamy, and harder to spread; and if fifty per cent. is saved in the oil, thirty per cent. is lost in time, and ten per cent. in the extra quantity used; so, after all, there is not much saved in its use.

Pumice Stone, the lava of the volcanoes, is found floating

upon the surface of the sea. It is a very useful article, which should be used much more than it is for rubbing down painted work.

FIRE-PROOF PAINT. This paint is coming into use to a considerable extent. It contains several of the alkaline, metallic, and combustible salts, and is, of course, to a great extent, fire proof, even when mixed with oil. It works light, frothy, and soapy, and for this reason many painters do not like it. It is cheap, however, and durable, but only fit for dark work.

VARNISHES.

Though varnishes are now made at the manufactories cheaper and better than home-made varnishes can be, yet for the sake of convenience a few methods will be given.

COPAL VARNISH.

Gum Copal, ...	8 pounds.
Linseed Oil, . . .	2 gallons.
Sugar of Lead, . . .	½ pound.
Turpentine, . . .	3½ gallons.

Boil till stringy.

Another:

Gum Copal, ...	8 pounds.
Oil, ...	2½ gallons.
Sulphate of Iron, . . .	¼ pound.
Turpentine, . . .	5½ gallons.

This is a good varnish for house and sign painting. In making the above varnishes, the gum should be melted in a small quantity of boiling oil, and poured gradually into the kettle containing the other oil, while boiling. When it is

all done, and cool enough so as not to ignite the turpentine, the turpentine should be added.

BLACK VARNISH, quick drying, and cheap for common purposes, such as iron fences and other rough work.

Black Pitch, ...	28 pounds.
Asphaltum, from Tar, .	28 pounds.

Boil eight or ten hours, then add 8 gallons boiled oil, and gradually 10 pounds red lead, and 10 pounds litharge. Boil for three hours longer, and add, when lukewarm, enough turpentine to thin for working freely.

This varnish will dry in a few minutes.

CRYSTAL VARNISH. One pint Canada Balsam, in a bottle. Set in a warm place till quite thin, leaving it uncorked. Take from the fire, and while thin, add the same quantity of turpentine. Shake till well mixed.

For charts, maps, prints, and all paper ornaments.

JAPAN VARNISH.

Gum Shellac, ...	2 pounds.
Oil, ...	1 gallon.
Red Lead, ...	1 pound.
Litharge, . . .	1 pound.
Umber, ...	½ pound.

Melt the gum in a small quantity of oil, and then add it, gradually, to the other oil while it is boiling. Boil the whole till stringy.

This is a good, strong dryer, which gives to the paint a high gloss.

GUM ELASTIC VARNISH.

India Rubber, cut fine, . .	½ pound.
Linseed Oil, ...	½ pound.
Turpentine, ...	½ pound.

Add the gum to the oil while boiling. When dissolved,

add the turpentine. Boil the whole till clear, and strain Dries slow; if desired to dry quicker, use boiled oil. This varnish is brilliant, durable, and makes the cloth pliable.

Camphor Varnish.

Gum Copal, ...	4 ounces.
Oil Lavender, . . .	12 ounces.
Gum Camphor, . . .	¼ ounce.

Heat the oil and camphor in a pan, stirring; then add the copal in small quantities. When dissolved, stir and add turpentine almost in a boiling state.

This is transparent, pliable, and durable. For varnishing wire gauze, muslin, &c.

Gold Varnish.

Pulverized Gum Copal, . .	1 ounce.
Oil Lavender, . . .	2 ounces.
Turpentine, ...	6 ounces.

Put the oil in a pan on hot sand. When warm, add the turpentine and copal, as in the camphor varnish.

Turpentine Varnish.

Rosin, ...	5 pounds.
Turpentine, ...	1 gallon.

Boil till the rosin is dissolved.

White, Hard Varnish.

Gum Mastic, ...	1 pound.
Gum Anima, . . .	4 ounces.
Gum Sandarac, ...	5 ounces.
Alcohol, 95 per cent., . .	2 ounces.

Add all together, put in a warm place, and shake often When the gums are dissolved, strain through a lawn sieve.

VARNISH FOR GLASS. Pulverized gum tragacanth, white of egg, equal quantity. Stand till dissolved. Spread on the glass carefully with a brush.

GLAZE VARNISH.

Powdered Sealing Wax, . .	½ ounce.
Alcohol, 95 per cent., . .	2 ounces.

Keep in a bottle in a warm place till the wax is dissolved.

This varnish gives a beautiful glazed polish to paper, straw, leather, and the like.

SHELLAC POLISH.

Gum Shellac, ...	¼ pound.
Alcohol, ...	1 pint.

Keep in a warm place till the gum is dissolved.

This makes a splendid polish for any fine article of furniture, guns, &c. It is best rubbed on with a cloth; moisten the cloth with the polish, and rub over the work briskly. It dries in a moment, and twenty coats may be put on in as many minutes. It is also a good (perhaps the best) thing for killing knots, and is altogether a very useful article, and no paint-shop should be without it. Rough and weather-beaten signs, cloth, and such like may be coated with it, which will make the work hold up the color better. Dry paints may also be ground in it, for painting signs on cloth or paper. It holds the colors from flying, and will stand the weather.

Remarks. — Any colored varnish may be made by adding any of the transparent colors. Oil varnishes, when too thick, should be thinned with oil; distemper varnishes should be thinned with alcohol.

Much care should be observed in making these oil varnishes, that they do not take fire. If they should catch fire,

have a board that will cover the top of the kettle ready, and place it on immediately.

Gold Size. Various methods for preparing gold size have been adopted.

Usual Size. Boiled oil, stirred up with a small quantity of litharge and red lead. Set it aside and slake often, till bleached; then draw off and bottle. Raw oil will do where a slow-drying size is wanted.

Best Size. Raw oil, heated in a pan till it gives out a black smoke. Set fire to it, and let it burn a few minutes. Extinguish it by covering the pan over. Pour, while warm, into a bottle containing pulverized red lead and litharge. Keep in a warm place, slaking often, for two weeks, then decant and bottle.

Bronzing Size. Asphaltum, boiled oil, and turpentine, mixed in proportions to flow evenly.

Inside Size. Honey, diluted with water, vinegar, or any liquor. Glue size, beer or ale, white of egg, gum arabic, or any glutinous or albuminous substance may be used.

Remarks. — Oil gold size is thinned with turpentine. Lemon chrome yellow should be ground in the oil size.

Mixing Colors and Using them.

It is not proposed to go into an elaborate detail and minute description of divers ways and preparations of mixing colors and doing work, for the experience and taste of the worker only must be his guide; but it will be the endeavor to correct errors which have crept into use from careless and inexperienced workmen, and sundry "receipt books" which have been compiled by any but a practical painter.

PRIMING. Quite too little attention is paid to this department. The color is usually mixed up too thin and put on too heavy. The reverse is much the best. Let the priming be as thick as will spread easily, and then be well rubbed out under the brush. Litharge is the only drying necessary in priming. All work, inside or out, may be primed the same.

PUTTYING. After the priming, *all* work should have the nail-heads and cracks puttied up. It should be done with a putty-knife; puttying up with the fingers is a barbarous practice, and does not fill the holes well.

SAND-PAPERING and dusting should be done before the puttying; being done afterwards, is apt to dish out the puttied places.

SECOND COAT — *Outside.* Mix with raw oil, and use it as thick as it will spread easily. After the work is all covered, it should be cross-smoothed till it has an even surface, and then finished lengthwise, with long sweeps of the brush, pressing lightly.

THIRD COAT. Made a little thinner than for the second coat, and rubbed out as much as possible, cross-smoothed, and finished with the tip of the brush very lightly, so as not to show the brush marks.

SECOND COAT — *Inside.* Mixed as thick as it will work, with equal parts of raw oil and turpentine. Particular care should be taken to rub this out well, cross-smoothing and finishing with the tip of the brush; else the color will lie in ridges, which the next coat will not hide.

THIRD COAT. Mixed with three parts turpentine and one of raw oil, rubbed out thoroughly and smoothed carefully, so as to show no brush marks.

FOURTH COAT — FLATTING. Mixed with all turpentine thin enough so that it may be spread before it sets. Spread over quickly, without cross-smoothing; finish lengthwise

with light sweeps of the tip of the brush; three or four strokes will be as much as one can do before it sets. Square up and finish each piece of work before beginning another.

Drawn Flatting. Mix up the ground lead with turpentine, nearly as thin as for flatting. Let it stand till the lead settles and the oil and turpentine rise to the top. Pour it off and mix again, and repeat the operation till that which rises to the top is clear turpentine. By this process, the oil in which the lead is ground is entirely drawn out, and the lead is mixed with turpentine. This color, however, is quite different from what it would be if the lead had been ground in turpentine. It is more tenacious, and flows better.

Much care must be taken to spread this on thickly and evenly. The room must be kept close, and free from any draught of air, as the color sets as fast as put on. This is used only as a fourth coat.

Polish White. This chaste and durable finish requires the zinc white to do it properly. It is made by mixing the zinc white with white varnish.

Common Method. After priming and second-coating in the usual way with lead, finish with the polish white.

Best Method. Put on two coats, as above, and then spread on several coats of yellow ochre, turpentine, and japan, with a little litharge. When dry, rub smooth and level with pumice stone. Then put on one coat of inside second coating, and flatten as usual; rub down with pumice stone, then a coat of polish white, and finish with a flowing coat of white varnish, in which is mixed some of the zinc white.

Remarks. — When work is to be finished with a gloss, the previous coat should be a dead surface; when it is to be flattened, the previous coat should have a degree of gloss.

Lead is the white referred to in the above descriptions, yet the rules given for mixing may be applied to all other colors, except that the darker colors are generally finished with a

gloss, inside or out. They require no turpentine only when they are to be varnished.

Oil dries with a glossy, turpentine, with a flat surface.

It is a wrong idea to put on heavy coats of paint; the more it is rubbed out, the better will the work look and wear. Each coat should stand two or three days before receiving another coat.

Color needs more drying in winter than in summer. Outside work lasts longer if painted in cold weather, as not so much of the liquid is evaporated, and a heavier body is thus dried upon the surface.

Litharge or japan is a good dryer for outside work, and for priming in the inside, or for dark colors; but sulphate of zinc is only fit for the last coats on the inside, though sugar of lead is used. Either of them may be dissolved in water, and stirred into the color.

Transparent colors will work more freely, and spread on with an evener flow, by being mixed with raw oil and japan, with a little water stirred in.

In mixing thick colors, the liquid should be added gradually, else the lumps will not be thoroughly broken.

MIXING TINTS.

The first principle in mixing tints is to take the body color, or that ingredient which predominates, and add to it, gradually, the other colors. The principal ingredient may be thick, but the others must invariably be thin, or the lumps will spread out under the brush, leaving a streak of corresponding color.

In describing the manner of mixing tints, the predominant color will be mentioned first, the second next, and so on, as it would be impossible to give the exact proportion

of each color used in any given tint. Thus, for instance, violet is mostly red, the next in quantity blue, and the least white, and so on. In this manner the following table exhibits almost every tint which the painter will be likely to require, leaving to his taste the peculiar tone:—

Table of Tints, and the Colors necessary to produce them.

Gray,	White Lead and Lampblack.
Buff,	White and Yellow Ochre; Red.
Pearl,	White, Black, Blue.
Orange,	Yellow, Red.
Violet,	Red, Blue, White.
Purple,	Violet, with the addition of Red and White.
Gold,	White Stone Ochre; Red.
Olive,	Yellow, Blue, Black, White.
Chestnut,	Red, Black, Yellow.
Flesh,	White, Yellow Ochre, Vermilion.
Limestone,	White, Yellow Ochre, Black, Red.
Sandstone,	White, Yellow Ochre, Black, Red.
Freestone,	Red, Black, Yellow Ochre, White.
Fawn,	White, Yellow, Red.
Chocolate,	Raw Umber, Red, Black.
Drab,	White, Raw, and Burnt Umbers; or White, Yellow Ochre, Red, Black.
Bronze Green,	Chrome Green, Black, Yellow, or Black and Yellow, or Black and Green.
Pea Green,	White and Chrome Green.
Rose,	White, Madder Lake.
Copper,	Red, Yellow, Black.
Lemon,	White, Yellow.
Snuff,	Yellow, Vandyke Brown.
Claret,	Red, Umber, Black.
Dove,	White, Vermilion, Blue, Yellow.
Pink,	White, Vermilion, Lake.

Cream,	White, Yellow.
Salmon,	White, Yellow, Raw Umber, Red.
Straw,	White, Chrome Yellow.
Peach Blossom,	White, Red, Blue, Yellow.
Lilac,	White, with Violet.
Changeable,	Red, Green, lightened with White.

Remarks. — Any of the positive colors are made to any degree of lightness with white or yellow.

Colors for tints work best when mixed with raw oil.

All tints must be graduated by the taste of the artist, recollecting that practice and experience are great helps.

The finer the quality of the colors used, the purer and more beautiful will be the tints.

All colors should be ground before mixing, as the dry color does not stir in well.

CONTRAST AND HARMONY.

As the direct union of any two of the positive or primitive colors are harsh and unpleasant, neutralizing colors may be used, which, while they do not destroy the contrast, preserve the harmony.

One color will generally harmonize with another when both contain the same base in different proportions.

The choice and arrangement of colors in decoration should always be left to the artist, who should make these principles his study.

The following table, partly arranged from Alison, will give an idea of the principles of contrast and harmony, and will be found valuable in regard to the selection of colors for decoration : —

This Color	Contrasts with	Harmonizes with
White,	Black, Brown,	Any Color.
Yellow,	Purple, White,	Orange and Pale Colors
Orange,	Blue,	Red-Pink.
Red,	Green,	Crimson.
Green,	Red,	Yellow.
Purple,	Yellow, White,	Crimson.
Black,	Pale Colors,	Deep Colors.
Gold,	Dark Colors,	Light Colors.

There is also an *harmonious* contrast, which must ever be observed in decoration, as it neutralizes the strong contrast of opposing colors.

Any of the colors of strong contrast may be made to harmonize pleasantly, by dividing them with a line of white, or any neutral tint. Thus, green and red, when placed together, may be made to harmonize if the glimmer be relieved by white lines which divide them. The width of the line should be in proportion to the size of the object, amount of surface, or the distance at which the object is to be viewed. There is great scope in the combination of colors, and the beauty of their arrangement, which practice, and a familiarity with their principles, will discover.

Some of these combinations of display may be seen in the annexed table.

WHITE, as a ground color, sets off well with blues, purples, violet, reds, greens, browns.

BLACK, with drabs, pink, lemon, gold, light blues, greens, purple, salmon.

BLUE, with gold, pink, salmon, buff, light blues, yellows, and drabs.

GREEN, with gold, purple, pink, lemon, dove, flesh, stone, pearl, light greens, and yellows.

RED, with lemon, pearl, gold, pale blues, and greens.

Remarks. — Light blues with dark greens, and *vice versa*, if divided with a line of white, pink, or pearl.

No two colors should be placed side by side, unless lined by a relieving color.

The placing together reds, blues, and greens, when of the same depths of tone, will always glimmer and look dirty; but the harmony is restored by dividing their lines of connection with neutralizing tints.

When tints of barely a perceptible difference in shade are laid side by side, beginning with white, for instance, and making each stripe darker and darker, there will be no dividing line visible, but the whole surface, if a proper distance be allowed, will blend together like the tints and gradations of a sunset sky; the tone is much purer and clearer when each tint is thus separate, than as though it were blended with a brush. Some of the beautiful frescos in mouldings, columns, &c., are done in this manner.

TRANSPARENT COLORS.

There are several colors that are natural transparents; others that may be made so by mixture.

The transparent colors are *Terra de Sienna*, *Asphaltum*, *Dragon's Blood*, *Carmine*, *Rose Pink*, *Chemical Brown*, all the *Lakes*, *Gamboge*, and all the *Gums*.

Semi-transparent: *Umber*, *Vandyke Brown*, *Chrome Red*, *Emerald Green*, *Brunswick Green*, *Ultramarine*, *Indigo*, *Verdigris*.

Remarks. — These colors should be ground very fine, and spread on evenly.

If to be shown with a strong light, two coats may be given; but if a subdued light, one coat is better.

Transparent colors are purer if elutriated; that is,

ground fine in water; let it settle; pour off the top part of the settlings; mix that up with more water; let it settle, and take the top half of that, which will be free from all sand and grit. If the pure part of the pigment, however, should be the heaviest, discard the top and use the bottom of the sediment. Usually, however, the purest coloring part settles upon the top.

Any of these colors will work more evenly, and be more transparent, if a small quantity of water be mixed while grinding.

Turpentine makes transparent colors work crumbly.

Bleached boiled oil, or white varnish, is the best vehicle for flowing evenly. Raw oil does very well, only that transparent colors are always difficult to dry.

Miscellaneous Items and Rules.

Under this head will be given a variety of items which will embrace every department of painting, and will be found of great use to every painter, — novice, amateur, and master, — inasmuch as it is the experience of the best painters in America. Many of them will be found to be new, and all of them valuable. In fact, it is intended as a sort of *vade-mecum*, to which the painter can at any time, when at a loss, turn and be almost sure to find just what he wants.

Killing Knots. Glue size and red lead. Gum shellac dissolved in alcohol, and mixed with red lead. Gutta percha dissolved in ether. But through all or any of these will the pitch of the knot exude if exposed to the sun. Perhaps the very best method is, to size the knot with oil size, and then lay a leaf of gold or silver on it. In a very choice piece of work, a hot iron may be held over the knot till a good portion of the pitch has come out and been scraped

off, when the two coats of the leaf will be sure to keep out both the pitch and any discoloration.

KILLING GREASE. Old work is always more or less greasy and smoky. Wash over the smoky or greasy parts with nitre, or with very thin lime whitewash. Soda will do, but lime is the best and cheapest.

SOAP-SUDS, when used to wash old paint, should be well rinsed off, as it prevents the paint from drying, especially on greasy work. It will not sufficiently take the grease out; lime-water is best.

Any work that fails to dry, may be made to do so, by rubbing it all over with japan and turpentine — rubbing it well in with a brush.

PLASTERED WALLS. A coat of glue size before painting in oil. It is also best upon the white plaster or hard finish walls.

PUTTYING should be done after priming. Putty for stained work or naked wood may be made of glue water and whiting.

SANDING should be done on the fourth or fifth coat, and then a coat of paint on the sand. A pair of bellows, with the nose of a watering-pot upon the nose of the bellows, is the best way to sand cornices and perpendicular work. It may be blown on in this way without so much loss.

CANVAS AND MUSLIN. Dissolve a little India-rubber in boiling oil or turpentine, and add a little of this to thin paste while both are hot. This is the best size for cloth.

TRANSPARENT CLOTH. Stretch the cloth tight.

Pulverized White Rosin, . .	1 pound.
Bleached Linseed Oil, . .	12 ounces.
White Beeswax, . . .	3 ounces.
Venice Turpentine, . .	12 ounces

Heat the first three articles till dissolved, then add the

turpentine while hot. A good varnish for curtains and all similar work. Varnish both sides.

Water-Proof Cloth. Equal parts of yellow ochre and lampblack; mix with it an equal quantity, in bulk, strong boiling soap-suds. Lay on as thick as the brush will spread. In three days finish with black paint.

Rough Work. Any of the ochres or lead, mixed with coal tar and thinned with turpentine, make an excellent varnish for rough work, and is also a great preserver of wood from damp. Japan will hasten its drying.

Boiled Paint Skins. This is a very economical way of obtaining a cheap and durable color for all outside work. All the cleanings and scrapings of the buckets, and wipings out of the brushes, instead of being wasted on the wall, may be saved and boiled up in oil. The hardest and dryest paint skins, putty, &c., in this way are softened and rendered available.

A Good Cement for gutters and leaky places may be made of these boiled paint skins, if while hot and thick a portion of sand and fine lime be stirred in. It must be used while hot, and when dry will be as hard as iron, and as durable.

Cleaning Old Smalt. Old smalt on signs, &c., may be loosened by spreading on potash dissolved in water, or wet wood ashes or sal soda; or, if not too old, it is best scraped off. If the potash or ashes stand on too long, so as to soak into the wood, the paint that may afterwards be put on will not dry well.

Tar may be killed, so as not to show through the paint, if it be well scraped and washed with a mixture of equal parts of turpentine and ammonia, and then a coat of gutta percha dissolved in turpentine.

Hard Earth Colors, such as umber, Sienna, and the like, are much easier ground, either in oil or distemper, if

they are crushed up and allowed to stand in vinegar an hour or so. If to be ground in oil, the lumps should drip till the water is out.

SAPS will show if a piece of work of a plain surface be left half finished for too long a time. Begin no more of any plain surface than what can be finished before it sets.

FLATTING must not be touched up after it is once finished, or it will show a gloss.

GLOSS. Color put upon a gloss color will give the surface somewhat of a dead or flat appearance; whereas, also, flatting on flatting gives a degree of gloss. It is best, then, previous to the flatting finish, to have the ground slightly glossy; and for a gloss finish in paint or varnish, it is quite necessary to have the previous coat flat, either in color or in the rubbing down, though it must be understood that there must be a sufficient body of color underneath to hold up the gloss.

WASH BRUSHES in turpentine, and then in warm soap-suds.

HOT, STRONG LYE will clean old cans, cups, buckets, jugs, &c., from the dried colors.

SIGNS, and other small work, in cold weather, may be made to dry faster by heating at the fire, so as not to blister, and then placed in the cold to dry.

TURPENTINE has no specific drying quality. It hastens drying only by evaporation; and if there be no drying quality in the color used, it will not dry any better than if mixed with raw oil. Lampblack, for instance, would not dry at all.

GOLD CHANGING. This effect in gold leaf that is exposed to the air, has been a source of wonder and perplexity. Beautiful gold signs have sometimes been spoiled in the space of a year, having the appearance as though every other leaf was copper. It is probably caused by the copper alloy in the leaf, and the smoke leaving a deposit of sul-

phur. When the size is too wet, and the leaf is rubbed too hard in spots, the oxygen of the atmosphere unites with the salts of the tint underneath; perhaps, also, by some of the leaves being hammered thin in the middle. Where it is from a deposit of sulphur, it may be washed off with weak sulphuric acid, or even with vinegar.

Gutta Percha is an excellent article, dissolved in hot oil and turpentine, for sizes, giving gloss, durability, and flexibility to varnishes. Gutta percha may be made available for many uses to the painter if experimented with.

Pencils. Camel's hair and other pencils and fitches work better and last better if, when done using them, they are rinsed in turpentine and washed in soap-suds. When this is not done, keep them in raw oil.

Rinsing Cup, made like a quart measure, having a small tin cup perforated at the bottom with fine holes, and fitting into the top of the large cup, and reaching down one third its depth. Fill the large cup with turpentine till it reaches over the perforated bottom of the small cup. Rinse the pencil in this, and the color settles to the bottom, leaving the turpentine always clear. Afterward wash, if desired, in soap-suds.

Penciling Brick. Straight-edged rules should be used as a guide to drawing the lines, perpendicular as well as horizontal. Drawing these lines by guess, as is the practice with some, does not fail to show itself in the want of uniformity. The lead for lining works best when mixed with turpentine; used thick so as not to run.

Burning Lampblack is a great help to its drying. It also works better, and has more body. The best way to burn it is to pour upon it enough alcohol to saturate, then set fire to it, and let burn till it goes out itself. By this means the grease will be entirely burned out without injuring the black.

Three Coats are required to bear up and cover. Two coats will not bring out an even gloss surface on any new wood, even though the wood be sized.

Oil Floors with boiled oil, in which is ground a little litharge. The tone of color, if a color is required, may be made by adding any of the transparent colors.

Man Helps, made with a strip of plank or a broom-handle, with a hole in the end to admit the brush-handle, are very convenient to reach high and difficult places.

Stubby-Brushes should never be used in turpentine color, as they spatter badly. They are only fit for painting hearths, rough bricks, or weather boarding.

To Cure Damp Cellar Walls. Boil two ounces of grease with two quarts of tar for nearly twenty minutes in an iron vessel, and having ready pounded glass one pound, slacked lime two pounds; well dried in an iron pot, and sifted through a flour sieve. Add some of the lime to the tar and glass to form a thin paste only sufficient to cover a square foot at a time about an eighth of an inch thick.

To Preserve Wood and Brick Work from Damp Weather. Take three pecks of lime slacked in the air, two ditto of wood ashes, and one peck of fine sand. Sift them fine, and add linseed oil sufficient to use with a paint brush; thin the first coat, use it as thick as it will work the second coat. Grind it fine or beat it in a trough.

To Whiten Linseed Oil. Shake up daily two ounces of lithrage in a gallon of oil and eight ounces of spirits of turpentine, for fifteen days; afterward let it settle three days, then pour off the clear part into a shallow vessel and place it in the sun three days, to whiten and clear it.

Clarifying Oil. Various metallic salts are used. Sugar of lead, or white vitriol pulverized and well mixed with

the oil, the whole to be set aside for two weeks, shaking occasionally at first. When settled and bleached, it may be decanted. Oil mixed up with water, then letting the water settle and pouring off the oil, is a very good way to remove any impurity in clarifying oil. It should be done in a corked bottle, as all clarified oils, when exposed to the air, become putty before they are done.

SHELLAC FOR PAINTING. Alcohol, with gum shellac dissolved in it, is an excellent vehicle to mix colors for painting ornaments or letters on cloth or paper. It works very free, holds the brilliancy of the color, and will stand the weather.

PAINTED CLOTHING. Equal parts of turpentine and spirits of ammonia will take out the paint spots from any kind of clothing, no matter how old, and dry, and hard, it may be. Saturate the spot with the liquid, perhaps two or three times, till the paint is soft, and then wash out all with soap-suds.

REMOVE OLD, HARD PUTTY. Take a brush or a bit of cloth tied to a stick, and spread over the putty with muriatic acid. The hardest putty in this way will soon become soft, and may be scraped off with the putty-knife. The acid should be well rinsed off.

VARNISHING.

All work, before being varnished, should be prepared with a dead surface, either by mixing with turpentine or by rubbing down with pumice stone. In very finely finished work, requiring a *level* surface, rub down with solid pumice stone and water; where only smoothness is necessary, rub with pulverized pumice stone with water, using for a rubber any woolen cloth, or felt, or buckskin.

THE FIRST COATS should be spread on evenly, and well rubbed out. Two, or four, or six coats may be given without rubbing; then, previous to the last coat, rub till the gloss is destroyed, after which give it a heavy flowing coat.

THE FLOWING COAT. Where work is to be finished on a cheaper plan, the rubbing need not be done. In this case give two or three coats, well rubbed out, and while the last coat is quite sticky, so as to make the brush drag through a little toughly, put on a heavy flowing coat of thick varnish — put on so heavily that it will flow evenly of itself. This, after thoroughly dry, may be polished.

POLISHING. Rub down with finely pulverized pumice stone till smooth and even; wash off. Then rub with rotten stone and sweet oil. Clean off the oil, and polish with chamois leather. Some use only the hand to finish with, which is quite as good after being rubbed with rotten stone and sweet oil. If the under coats of paint are not thoroughly dry, the varnish will be apt to crack.

GLAZING.

Sashes are primed before glazing.

Glass laid in with the crown or convex side out.

The tins driven in with a chisel or glazing hammer; four tins to each glass on the two long sides, about one fourth of the distance from the corners. If tins are put in the center, they are apt to break the glass, especially in cold weather.

BACK PUTTYING. In good work and medium-sized glass, after the glazing is done and the putty well set, fill the spaces on the inside. Use the putty soft, or it will press the glass out.

BEDDING, for superior work and large glass, is the best.

Glaze the rabbet with soft putty, and press the glass down into it as close as it will lay, pressing on the edges and not the middle of the glass, then glaze as usual.

Where the moulding of the sash is to go outside, the crown side of the glass should be out also.

Cleaning after the glazing is done, with water and a brush, or with whiting and a dry brush. The line of the putty should come just even with the line of the moulding on the other side of the glass.

Re-glazing. A sharp, square-pointed chisel is the best to take off the old putty. Potash is sometimes used to soften the putty when it is very hard.

The best diamonds are the cheapest. Those cuts which make the least noise are always deepest.

LETTERING.

If one has no taste for this branch of the art, it will be a difficult matter to teach him, by rules, to make a graceful letter or ornament; but, presuming that every one who engages in the business *has* a taste, a few rules will be laid down which will not fail to convey the right principle.

The following principles of lines from Hogarth are truly valuable: —

Heavy Lines, when perpendicular, express strength When angular or horizontal, harshness.

Fine Lines express smoothness and delicacy.

Angular Lines are harsh and unpleasant. Therefore, the least beautiful lines are heavy and angular; the most beautiful, fine and waving.

All objects are more or less beautiful, as they contain this waving line, which is the line of grace and beauty.

According to this principle, the curved letters, such as

B, R, S, and O, are the most graceful, and the angular letters, A, V, and W, most harsh.

The most graceful form of letters is the Roman, or Roman fancy, while the most solid and substantial are the square block letters.

Though all the varieties of letters contain all these principles, yet the taste of the artist will lead him to make such combinations as will best please the eye, recollecting that all combinations, to be beautiful, should be uniform, not having strong, angular lines united to fine, waving ones. This applies also to all ornament.

UNIFORMITY.

In addition to these rules, uniformity must also be regarded, for uniformity not only applies to single lines, but to successions of lines, for irregular lines that are not in keeping are very unpleasant and unattractive to the eye; and though the beauty of scrolling, or other ornament, is sometimes heightened by irregularity, yet the same rules of uniformity, grace, and keeping must be preserved, or the work will not make a graceful display.

From these principles we may deduce the following rules, as they apply to letters and ornament: —

Perpendicular and horizontal lines, with their angles, must be parallel.

Curves must hold the same proportional relation to each other.

Spaces between lines must be uniform, and in proportion to the size and length of the lines.

Perpendicular lines should be heavier than horizontals, and angles lighter than either.

The heaviest part of curves should be a little heavier in the center of the swell than perpendiculars, as a Roman O at the swell of the sides is heavier than the body of an I. They should also extend a little below, and very slightly above the line.

A true and well-proportioned Roman letter should have the main body four times as wide as the stems, or projecting points, and the length four times as long as the body is wide.

Block letters should have the horizontal and angular blocks a little narrower than the perpendicular ones.

The Egyptian or Gothic blocks are governed by the same rules as the square blocks, except that they are made without any projecting stems.

Fancy letters must be governed by the principles of the standard letters after which they are modeled; and the most perfect way to make a fancy letter, for the beginner, is to first make the standard letter, Roman, Block, or Gothic, and then rub out and add, still preserving the general outline or character, and thus alter to any ornamental shape that may please the eye.

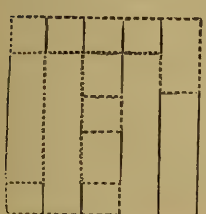
GENERAL RULES.

In adopting a series of rules for lettering, it must be recollected that the eye, after all, is the most reliable guide; for, unless one has a tolerably true eye, it will be almost in vain to attempt to make a series of graceful characters. Two qualifications are positively requisite. He must have some artistic taste; he must have some mechanical skill. A knowledge of architectural drawing would be a benefit to the painter, yet it does not furnish the desired rules, and one may study geometry and mensuration for half a life-

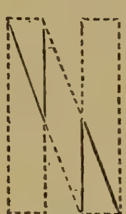
time without being able to succeed in graceful lettering and scrolling.

The rules that can be given are but few and disjointed; no continuity of rules can be given that is not interfered with; for a rule, in its full application, that applies to one letter, will not to another; hence the eye must be the guide in the detail, as the rules apply only to the general character and outline; yet, irregular as these rules may be, if well studied, the learner will obtain principles which will not fail to aid him in this interesting pursuit.

The following diagram will give a very correct idea of the proportions of letters. Draw six perpendicular lines parallel to each other, and at equal distances. Then cut these lines with horizontal ones at right angles, making the spaces a little narrower. Then draw a letter upon the squares, by taking one row of squares for the stem, one for the body, two for the space, and so on, till the letter is finished, the dotted lines forming the letter, thus: —



Block.



Gothic.

Roman.

This rule is best adapted to the Block and Gothic, to which it applies almost without an exception; yet it serves as a sort of general guide to the Roman. But it will be perceived that all letters do not require the same number of lines and spaces laterally. A block I, for instance, requires only three squares in width, while an M requires seven. Some again require half squares to give them their proper proportion.

The diagram on the preceding page serves to show the first principles of standard letters, but among the exceptions may be enumerated the following: —

The horizontal cross bars of A and G must occupy the distance from the center of the middle space to the center of the space below it.

The upper arm of the E extends downward a space and three fourths or a half, while the lower arm reaches upward two spaces, and outward, laterally, about one eighth of a space further than the upper arm. This is necessary, in order that the letter may be balanced, and not look top-heavy.

The oblique bodies of the M come to a point, or nearly so, at the bottom; it makes the letter more compact, and gives more room for the stems on the inside.

The lower upright stem of the S reaches up two squares the upper one reaches down a square and three fourths or a half. The lower space, also, is a little the largest. The body of the S runs a little obliquely, being even with the lower stem in the left, and projecting a little beyond the upper stem at the right. The same rule applies to the Z.

The inside stems of the H, R, M, W, X, and Y are a little the shortest, otherwise the letters would be too much spread.

These rules and diagrams apply to all the standard letters; that is, Roman, Block, and Gothic.

FANCY LETTERS

Are of every style, shape, and variety that the ingenuity of the artist may invent, yet to be graceful and beautiful they must be governed by the rules laid down for letters and scrolling.

It would be impossible to present a specimen of the numerous fancy letters that may be made from the standard letters. The taste of the artist will guide him in the curves, turns, and points necessary to form the standard letter into a fancy one. He will also find that one form will suggest another; and it is quite astonishing how many changes may be made by the combination of two simple characters, the curved and the straight line, — for all forms and shapes in art or nature are produced by these two lines alone in combination.

MEASURING AND RULING. Unless the eye be true and the hand steady, and both well practiced, measuring with the dividers, or other instrument, from point to point, the width of the bodies, spaces, &c., is actually necessary in order to preserve the uniformity of the whole work when finished. But the artist should not allow himself to *rule* his letters or ornaments, for it gives such a stiff and rigid appearance as will not fail to discover the unpracticed hand; in fact, no practice is sufficient to overcome or disguise the stiff and cramped look that characterizes a figure whose lines are drawn by rule and compass.

The letter, scroll, or ornament, when any degree of perfection is required, may first be outlined with chalk, and then corrected with the lead pencil or crayon; otherwise a rough outline, or a few dots, to serve as landmarks, will be sufficient: and the beginner should bear in mind that the less marking used in outlining, and the more careless and

off-hand the letter or ornament is made, the more easy and graceful it will be.

The relative position of the letters on the board should be such that there is about the same amount of space between each two letters; thus, an A coming after an L, the two should be closer together at the nearest point than an I and an H.

The spaces above and below the letters occupy about one eighth of the width of the board, and the space between any two lines of letters may be a little narrower.

PUNCTUATION should be observed. It is quite as necessary to punctuate the reading upon a sign as in a book. There seems to be little regard paid to this at present, and the consequence is, that havoc is made of the "king's" English sometimes.

CREEPING of the color may be prevented by any means that will partially destroy the gloss of the ground-work, such as rubbing with the hand, breathing on it, rubbing it with a sponge or cloth with warm water, or weak soapsuds or turpentine, or, which is best of all, alcohol. Colors mixed with varnishes or boiled oil are most apt to creep when laid on a glass ground-work.

The ground-work of a sign should be, to use an old painter's expression, "put on thick and rubbed out thin." It is the correct principle in all ground-painting.

Signs, as all other painting, should be flatted for inside, and glossed for outside; though a little turpentine may be put in the last coat, for outside, in cold weather.

A good sign should receive four coats of ground-color.

The rest stick, or "mahl stick," in drawing lines; or the right hand may rest on the thumb of the left, while the little finger of the left hand touches its tip upon the board, and thus in turning, as on a pivot, the pencil has considerable scope.

Press the pencil down closely, and make clean sweeps as nearly as possible to the desired line, so that every stroke shall count.

GOLD LETTERS.

Care should be first taken to have a smooth ground to size on. Three or four coats will be sufficient; less will not do. The size should be limpid, and thin enough to flow freely and evenly, and well rubbed out, which it will bear if the ground-work be well filled.

POUNCING, to prevent the gold from sticking to the ground, may be done with whiting, starch, or rose-pink in a flannel cloth; or the surface may be rubbed with a slice of potato, or with the white of egg and water, or anything containing starch, glue, or albumen in a small degree. However, whiting, rose-pink, or charcoal are the most convenient, and the most certain also. The pouncing should be very lightly dusted off after pouncing, and before sizing, with a blender, or other light, soft brush, or the size will spread.

SMALTED GROUND. Cut in around the letters with a color similar to the color of the smalt to be used. The color should be mixed with flowing boiled oil. The smalt should be sprinkled on freely, and if not very fine, like blue zaffer or the like, it may lie on for an hour or two, in order to give it a chance to absorb the oil. By this means the sign gets more of a body and depth of color. A very small quantity of white glass frosting, crushed fine, and thoroughly mixed with the smalt, gives it a beautiful sparkling appearance.

Flock is used the same as the smalt, except that it must be sifted on, and the flock must be well dried.

Shading, for the blocks or edges of the letter, may be

done with colors on the board before the smalting, but the most beautiful effect for the shadows and high light is produced by putting the color, made thin, on the smalt after it is dry. A fitch is the best for this purpose.

ORNAMENTING on the gold may be done with terra de sienna, umber, asphaltum, or any transparent color.

Where the letters come over any puttied spot, the puttying must have two coats, or the size will not stand out.

EMBOSSING on the surface of the gold with sienna, umber, &c., for the darks, and white, light yellows, greens, blues, gamboge, &c., for the lights.

ENAMELING, or gilding on glass. Outline on the glass with black or asphaltum, or other dark color, a fine line to enclose the gold; when dry, the glass where the gold is to be laid, wetted with water, with or without a *very little* white of egg, gum arabic, or alcohol, or whiskey; this last is probably the best, as there is sufficient albumen in it to hold the gold. The breath, however, is one of the best things where the gold is fine, and where two coats are laid on, for the first coat. In a few moments it will be dry; rub off, tolerably hard, with a piece of cotton or silk; wet again with a full pencil, drawing but once in a place, over all spots that are not well covered, then another layer of leaf; when dry, rub off with cotton. Fill the back of the letter with asphaltum, dissolved in turpentine. Two or three coats are necessary. When dry, rub off the surplus gold with a slightly dampened sponge or cloth; or breathe upon it, and rub off with cotton or the finger. After it is all clean, the shade or ornament, in color, may be put on.

When the ornament is to be done on the surface of the gold, do it on the glass before the gold is laid on.

ANOTHER METHOD is to lay the gold first, where the letters are to go, then frame through a pattern or theorem the letters with charcoal, finely pulverized. Trace with three coats of asphaltum, and rub off the surplus gold

ANOTHER METHOD. Make a pattern of the letters of pasteboard or thin copper; lay this on several thicknesses of tin foil, and cut through the whole, making several duplicates; then coat these tin foil letters with a solution of gum arabic, and lay them on the glass. When dry, paint out the whole, glass and letters, with any color. Then wet and take off the letters of foil, and gild the places. A very pretty ornamental finish for these letters is, to put the ornament on the glass, where the foil letter has been taken off, with oil size, and then gild, when dry, with the enamel.

Painting with colors on glass requires two coats to make the surface even.

IMITATION OF STAINED GLASS. Paint the ornament with transparent colors. When dry, wash over the whole surface with sugar of lead ground in oil and turpentine, and while wet dab it all over with the end of a brush, very lightly; or lay a piece of muslin, wrung out in the solution, on the glass, and press it down closely; then taking one corner, lift it off. White lead may be used, mixed thin with boiled oil. Put on as little as possible, and pounce it all over with the end of a brush till it has an even ground surface.

Ornaments, cut of thin paper or tin foil, pasted on the glass, and the rest of the glass whitened, afterward taking off the paper or foil, makes a pretty effect.

It will be seen that letters must be done backward on the glass.

The white glass frosting, sprinkled over the ground-work of the glass while wet, gives a sparkling effect. It must be finely powdered.

TRANSPARENT SIGNS. Prepare the cloth with the camphor varnish (page 30); or, if large, like transparent cloth (page 41). Stretch tight, and prepare. Then key up the frame till the cloth is tight again. Cut the letters or orna-

ment of waxed cloth, stick them on the cloth. Then with stiff, transparent color, mixed with boiled oil or varnish, dab over the ground-work with the end of a brush. It may be shaded with any dark color.

After the canvas is prepared transparent, any colored letter may be put on.

TRANSITION SIGNS. Cut into the band around the board grooves the width of a hand-saw, one inch apart, then insert strips of tin one inch wide, and long enough to reach across the board, thus covering the face of the board. When fitted, take them all out, laying them down flatwise, and with the edges close together, and paint any word. When dry, turn them all over, still keeping them in their same place, turning them over from right to left. Paint the surface of the board with any letters, pictures, or other figures. When dry, slide the strips, in the manner in which they lay, into the grooves on the sign. This sign has a very magical effect, changing from one sign to another as the beholder passes by.

REFLECTING SIGNS. Paint the letters on the naked glass backward, in gold. Then, when dry, paint on the back side of these letters any color. Then make a frame or box, the part of which will receive this glass plate. Then bed in the box two strips of looking-glass, the edges meeting at the center and up at the back of the box, the other edges curving up to the edges of the glass in the front of the glass, forming an angle of ten or twenty degrees, to the plane of the frame in front. Lay the lettered glass in front, when you may graduate the angle of the reflectors. It will show three signs at once.

JAPANNED TIN. Rub over the tin with cotton and alco hol. This will take off grease or other matter that may make the gold stick. Then sketch the design with white crayon; or, sketch the design on paper, and rub over the back of the paper with whiting — rub it over with a cloth;

lay the paper on the tin, and trace the design over with a pointed stick. Size and gild, and rub off the surplus gold with cotton.

SHADES AND SHADOWS. Shading is understood, among the craft, as representing two sides or edges of the letters, supposing them to be cut of wood or other material. It is done with two or more colors, showing the light and dark side of the object. The lines are all parallel with each other, except when shaded in perspective, when the lines of shade all run to a vanishing point. Place the pencil at all the corners of the letter, on the bottom and right hand side of the letter, and draw downward at an angle of forty-five degrees. This will give the outline of the shade. The perpendicular and horizontal lines of the shade are parallel to the lines of the letter. Make the shade as wide as is desired. All these oblique lines must make a corner with the horizontal and perpendicular lines of the letter. The high lights are put on the side, and dark on the bottom. These rules apply to shading.

SHADOWING, is representing shadow cast by the painted object, and is always of one color, and dark, and should be a mere glazing of the surface. Black, umber, vandyke brown, and asphaltum are good colors to represent shadows. The shadow will be on the opposite side of the shading. The different appearance of the tones of the shadows depend upon the color of the ground upon which they fall, for the shadow should be transparent.

Take a letter cut out of a block of wood, and paint it any color. Set it up in the window, and there will be readily seen the form, color, and outline of the shade, as also of the shadows. By this means the beginner may obtain more real knowledge in regard to the position and manner of shading than could be told him in a volume. By painting and gilding the letter in various ways, turning the letter

edgewise, laying it down, tipping the top toward you or from you, will all give a correct idea of the form of letters, and the colors of their shades.

A trusty and judicious management of shading is necessary, lest some of the letters be thrown out of shape. S, B, K, and G, when they occur in a line of letters, will not admit of a heavy shade, else the whole inside spaces of the letters are filled with color. The shading should be modified to suit the letters in the line, so that each letter shall look free and easy.

Remarks. — POUNCING. A piece of flannel, or other loose cloth, filled with whiting, rose-pink, or charcoal.

MARKING ON GLASS. Wash the glass clean with alcohol and rotten stone, then give a coat of water and whiting; trace on this with a pointed stick, from left to right; turn the glass round, and paint backwards.

PERSPECTIVE LETTERS may be foreshadowed to suit the fancy, making a point of distance for each letter. The edge of a letter may thus be turned almost in front, showing the edge, top, and face side of the letter.

SHAPE OF PENCIL for drawing long lines or striping should be long and slim, and when used the pencil lays nearly its full length upon the board. For cutting scrolls and other ornament, the pencil is shorter, fuller, and when wet, has a sharp point swelling back to the center. For lettering, the same kind, with the point cut off square, but not too blunt. For filling up, short and thick. Camel's hair pencils are used mostly, though some prefer sable. They cost more, yet for heavy color are much the best, as they are stiffer, and hold the color without bending.

ODD FELLOWS' AND MASONS' APRONS, BANNERS, OR ANY SILK AND SATIN. Go over the whole surface to be painted with varnish, or egg and water. This will prevent the size or color from spreading. When dry, the figures may be

painted or sized in oil, and gilded. Where the work is not exposed to the weather, or is required to be done quickly, take white of egg with twice its quantity of water, or a solution of gum arabic; size with this, and lay the leaf while wet. Where color is to go on, let the size dry. Colors ground and mixed with varnish are not so apt to spread on silk and satin.

Sizing should be tacky enough to hold the leaf, and dry enough, when gilded, to rub down with cotton.

The following metal leafs are in general use: gold leaf, silver leaf, French leaf, Dutch metal, and zinc foil. These last two are of little utility to the sign painter. French leaf, however, which is made of pinchbeck, when the work is inside and at a distance from the eye, or where one leaf will cover one letter, shows very well for a time; but the laps of the edges, where two leaves join, soon begin to show. It costs about one twentieth as much as gold.

Silver Leaf is alloyed more or less with some baser metal, and consequently will not stand the weather, as the oxygen of the atmosphere soon oxydizes the inferior metal, and even the pure silver will soon tarnish when exposed to the weather. It is about one half the cost of gold leaf These inferior leaves require the size to be more tacky than for gold.

A very small amount of tallow touched to the cloth with which the leaf is rubbed will take out the wrinkles, yet it somewhat kills the gloss.

To clean old Paintings. A very excellent method of cleaning and restoring old oil paintings, is to cover them with wet cloths for three days, changing twice a day, and washing them off at each change. When clean and dry, rub them over with nut oil.

Tinseled Letters, or Chinese Painting on Glass, is done by painting the ground-work with any color, leaving

the letter or figure naked. When dry, place over the letters on the back of the glass tin foil, or the various colored copper foils, after crumpling them in the hand, and then partially straightening them out.

Oriental Painting is done in this manner. Various ornaments, birds, flowers, &c., are done very beautifully by using the colored foils. The copper foil can be had in the paint and drug stores all ready colored; but any color may be made with the tin foil (which is cheaper), by painting the tin foil with transparent colors, ground in gum water, or the picture may be produced by painting the figure on the glass with transparent colors, then placing the plain tin foil behind it. The background must be painted before putting on the foil, and then the foil may be put on in large enough pieces to cover the figure.

Grecian Oil Painting. Take any lithograph or other print, rub it well over with balsam of copaiva, thinned with turpentine till it is perfectly transparent; press it between folds of paper to get out the surplus balsam. Lay the face to a sheet of glass and set before a window, and paint with any transparent colors ground in oil, as near the natural color as possible. When dry, back up the print with white paper. The colors may be put on in careless patches, and when viewed from the front side has a very pretty effect. A few trials will be sufficient to show one how to manage the colors.

GRAINING.

This branch of decoration, like lettering, requires an artistic taste; nature, the eye, and practice being the best instructors.

In order to obtain any degree of perfection in the imitations of woods and marbles, it is necessary to procure

panels or bits of veneer, and copy the color and form of the grains as near as possible.

Graining in Oil. Mix the grain color in boiled oil and turpentine, and add a little soap, or whiting, or even both; it makes it flow better. Clean the sponge, &c., in oil or turpentine.

For Distemper, the grain color is ground in ale, beer, vinegar, or whiskey; the object being to bind the color so that it will not rub off. As a general thing, stale ale or beer is the best. Whiskey, however, in cold weather, might be preferred, because it does not creep like other fluids; but if the ground-work is rubbed over with whiskey it will be sufficient.

Graining should be done with a free and careless motion of the hand, yet having an eye to the character of the wood.

The descriptions of the manipulation will be as brief and distinct as possible, so as not to confuse the learner, and clog up his way with words.

Distemper Graining requires the ground-work to be dampened by rubbing all over with a sponge wrung out of the ale, previous to putting on the grain color.

The ground-work: as in other mixtures, take the body color first, and add the positive colors by degrees, till the required tint is produced.

The work may be primed, as for other work, with any light color. The second coat must approach to the ground-color, and the third coat must be the tint to grain upon, and is best mixed with a gloss, either for inside or out. Less than three coats of ground color will not make a good job.

In particularizing the specific quantities of proportion of ingredients, we are governed only by general principles. The artist must regulate the tint according to taste.

The brush, cloth, or sponge, or whatever tools may be

used, must be frequently washed out in water while doing a job.

GLAZING colors are transparent, and are mixed very thin whether the vehicle is oil or water.

BLENDING must be done by brushing the tit of the blender back and forth lightly over the work while it is wet.

BLAZING is done by sliding the blaze stick up, and bearing round to the right or left. The same motion is required in pecking in the fine check grain with the side of the blender; striking with the flat side of the blender, pushing the hand upward.

It is exceedingly difficult to describe the entire manipulation in graining. We therefore give a synopsis of the plan, and if the learner apply himself studiously, referring to this volume as a *Hand-Book*, he cannot fail to succeed, because the rules herein laid down he will find to be correct.

In copying the natural wood, it is the *character* of the wood, and not the particular individual lines and spots, that you wish to obtain.

MAHOGANY.

TOOLS. A sponge, or cloth, or a piece of buckskin for wiping out the lights.

A common paint brush, to put on the color.

A blaze stick, to make the bright blazes in the center of the branch. It is made of a piece of wood shaved down thin, or a paper card, three inches long and one inch wide, and very thin.

A blender, to soften the work.

A top grainer, to put in the dark grain.

GROUND. Chrome yellow and orange red lead. About one third lead, but sufficient to tint to a bright orange.

GRAIN COLOR. Burnt terra de sienna.

Dampen the work with the fluid you grain with.

Spread on the grain color with a brush; blend crosswise.

Wipe out, with a sponge or cloth, the light parts.

Blend again till soft.

Put in the blazes up through the center with the blaze stick.

Blend down the crude roughness of this lengthwise.

When dry, rub off with the hand or a soft cloth, the rough particles.

Give a coat of thin varnish.

FOR GLAZING. Add a small quantity of asphaltum to the grain color, so that it is a shade darker than before, and add ale till it is quite thin.

Rub it well out over the whole surface.

Blend it crosswise.

Peck it all over with the side of the blender, pushing the hand upward to produce the fine check grain.

When dry, put on the dark top grain.

Another method is, instead of making the check grain, to wipe the blender through the glazing, making the top grain in that way.

Dark or light mahogany is made by using corresponding colors in the ground, grain, and glazing.

When the graining does not tint, it may all be rubbed off with the wet sponge, and grained over again.

MAPLE.

TOOLS. Brush, to put on color.

Buckskin, to wipe out lights.

Blender and top grainer.

GROUND. Cream color, made with white lead and yellow ochre.

Grain Color. Raw sienna and raw umber, equal parts in all. Coat the work. Fold the buckskin, and with the edge wipe out the lights which make the curl. Blend lengthwise of the curl. Varnish with thin varnish, and when dry, glaze over the whole with the grain color made very thin, and to which is added a very little asphaltum.

Wipe out, with the sponge, large patches of lights, and blend crossings. When dry, top grain with the glaze color.

Bird's-eye is managed the same way, except that, after the grain color is laid on, patches of light are wiped out with a wet sponge. Blend, and then dot over the whole, in patches, by sticking the ends of the fingers over it. Then blend very lightly.

BLACK WALNUT.

Tools. Same as for mahogany.

Ground. Drab, made of lead, yellow ochre, Venetian red, and black.

Grain Color. Burnt umber.

The grain is made almost the same as for mahogany, only that the blaze stick is used more freely; and by specimens of the real wood, it will be seen that the blazes run nearly the whole length of the branch, and more regular than mahogany, running gradually from bottom to top.

ROSE WOOD.

Tools. A flat brush, sponge, blender, camel's hair pencil, and fitches. Ground. Drop black.

Spread on the color, and wipe out with the sponge or flat brush. The grains are put in with the top grainer and pencils. Glaze with rose pink and asphaltum mixed, and wipe out any knots or shadows to suit the fancy.

OAK.

Tools. Brushes, cloth, and coarse and fine combs, made of steel or leather.

Ground. Buff, made with white, chrome yellow, and Venetian red.

Grain Color. Raw umber and raw sienna, lightened up with whiting mixed with boiled oil. There should be whiting enough to prevent the color from running together when combed. Another method is, raw umber and sienna, with boiled oil, in which is melted a little beeswax or soap

Paint over the work, comb with the coarse comb first, lengthwise, then with the fine comb, with a waving motion.

Wipe out the grains, lights, &c., with a muslin cloth. holding it over the thumb nail, taking a clean spot of cloth for nearly every wipe.

Glaze with asphaltum, and wipe out large blazes of lights and put in dark spots with a sash tool. Asphaltum for glazing should be dissolved in turpentine, and then a little boiled oil added, to prevent its drying too quickly.

MARBLES.

Paint the ground-work, and when dry and rubbed down, dampen the whole surface with boiled oil, rubbed on with a cloth. For the light marbles, however, some prefer to work the grain in the ground color while wet.

Italian Marble.

Tools. Camel's hair pencils, blender, and sponge.

Ground. Black.

Grain Color. Gold tint, for bright veins. Burnt sienna, white and yellow ochre, fluid, oil, and turpentine.

Scramble out, in patches, with thin white lead, with a sponge; blend; then, with the hair pencil, trace in the larger dark veins with burnt sienna, then with yellow ochre, and lastly with the gold tint, running the lines over each other, yet all having the same general direction. It will be seen, from the specimens, that these veins are series of irregular loopholes and patches of light, crossed and connected by sharp, crinkled, and angular lines, the whiter lines being the sharpest.

When veined and dry, glaze with very thin asphaltum, in patches, to give it depth. Then varnish, and, if desired, polish.

Verd-Antique.

TOOLS. Same as for Italian, only fitches are used instead of pencils.

GROUND. Black.

GRAIN COLOR. White, yellow ochre, and green.

Scramble in large flakes of white with the sponge, and blend.

Trace in the other tints in veins, something similar to Italian, only less veins, and more heavy, being done in large, irregular circles. Blend softly.

Sienna.

TOOLS. Same as above.

GROUND. White and raw sienna.

GRAIN COLOR. Raw umber, raw sienna, white and black.

Cloud it over with a thin buff tint, in patches, using a sponge.

Vein with raw umber for dark, and raw sienna and black, mixed to a green tint. for the lights.

The form and character of this is similar to verd-antique, only the rings are more regularly round.

Blend lightly, and varnish when dry.

Gray and White Marbles.

This is very simple, though it requires some skill to do it nicely. Paint with white or lead color, and vein and mottle with black and slate color, in the wet paint, and blend it all down softly with a paint brush.

MISCELLANEOUS.

Shell Work. Ground with bright yellow or orange. Coat over with asphaltum, or any of the brown, transparent colors, though burnt umber is the most perfect for tortoise-shell. Wipe out lights with sponge or buckskin, or a roll of putty. Glaze with rose-pink or madder lake.

Glass, grained in this manner, is very beautiful. Grain first on the glass; when dry, coat with the yellow; or, grain with gamboge and chrome yellow, mixed, and coat over with asphaltum or umber. Use the colors in oil.

Ornamenting Paper is very prettily done by dropping some thin oil colors in water, a drop at a time. It floats and spreads upon the top in beautiful rings, and stands. Lay the paper carefully down on the floating paint, and it will receive the impression.

Granite. Ground with lead color, and spatter, first black and then white, over the work, by striking against a heavy stick which is held up close to the work. Use a stubby brush. The colors are mixed in turpentine.

KALSOMINING AND DISTEMPER.

Putty for Repairing Broken Walls. The best putty for walls is composed of equal parts of whiting and plaster-of-paris, as it quickly hardens. The walls may be immediately colored upon it. Some painters use whiting mixed with size; but this is not good, as it rises above the surface of the walls, and shows in patches when the work is finished. Lime must not be used as a putty to repair walls, as it will destroy almost every color it comes in contact with.

Another. Use plaster-of-paris and white sand in nearly equal quantities, mixed with water.

Ordinary Kalsomining.

Buy the best bleached glue if the walls are to be white or some light tint (if dark, it is immaterial so the glue be clean), and use it in the proportion of a quarter of a pound to eight pounds of whiting. Soak the glue over night; in the morning pour off the water, as it simply swells while soaking. Add fresh water, put it in a pail, and set that in a kettle of boiling water. When dissolved, stir it into the whiting, adding enough water to make it, after mixing, of the same consistency as common whitewash. It may be tinted any color, and is applied with a whitewash brush. If the color is rubbed smooth in a little water and then mixed with the wash it will be more even. If the walls have been previously whitewashed scrape away all that will come off, and wash with a solution of white vitriol—two ounces in a pail of water. The vitriol will be decomposed, forming zinc white, and plaster-of-paris, to which

the kalsomining easily adheres. It is important to dissolve the glue in a hot-water bath, for if scorched by too great heat its tenacity is impaired or destroyed. Whiting is simply chalk freed from impurities and reduced to a fine powder, and is also known under the names of Paris and Spanish white, though the latter is really a white earth found in Spain.

There is a great difference in whitewash brushes, and the beauty of the work, as well as the ease of performing it, depends very much on a good brush, making it well worth while to pay the difference between that and a cheap one. For the inexperienced it is more difficult to lay on tints evenly than pure white.

Size.

The best size for distemper colors is made from the clippings of the skin of animals, which must be subjected to strong boiling. Take the quantity necessary, put it into an iron kettle and fill it with water; let it stand twenty-four hours till the pieces are thoroughly soaked. Let the size boil five hours, occasionally taking off the scum. When it is sufficiently boiled take it from the fire, and strain it through a coarse cloth. If the size is to be kept for a length of time, dissolve two or three pounds of alum in boiling water, and add to every pailful. The size must then be boiled again till it becomes very strong; it must be strained a second time, put into a cool place, and it will keep sweet several months.

Compound Colors

Are formed by mixing two only, and will be the richest and best.

Distemper Colors for Walls.

If distemper is to be applied to a wall or ceiling which is covered with plaster, some whiting is put into water, where it may be easily broken and diluted if allowed time to soak; it must be completely saturated, and when it has settled, the clear water must be poured off. To correct the too great whiteness, and to prevent a yellow cast, grind separately in some water a little indigo or ivory black, and mix with it; then add to the mixture some strong size which has been previously warmed, well stirring the whole till properly mixed. The whole of the distemper must be strained while warm, in order to remove all impurities and thoroughly mix the color. When this is done, the distemper may be put into a cool place till it is formed into a weak, trembling jelly, which is the only proper state in which to apply it to the walls. All size distemper colors which are applied to walls, and which are mixed with whiting, should at all times be worked cold, and of a weak, trembling jelly, otherwise it will be impossible to make good work, and great care should be taken not to have too much body in the color, for it will certainly crack and fall off in scales, as it is not the strength of the size that causes the work to crack, but the body of color. There is a great advantage in having a sufficient quantity of size in the first coat of distemper, as it binds hard, and stops the suction of the wall, in consequence of which the next coat, if properly prepared, will not move the first coat, but it will work perfectly free, and when dry, the work will have a uniform and solid appearance. This method of whitewashing and coloring walls is far superior

to lime, as it works much smoother, and when properly mixed and worked upon a new wall, it will not crack and fall off in scales; it also covers better, and after being repeatedly applied for a number of years, the walls need no scraping, as the color easily washes off with a white-wash brush, after they have been well soaked with water.

Drab, in Size.

An excellent Drab.—Dissolve in water, whiting, and grind some burnt umber very fine in water. Mix it to the shade required. Strain the color as usual, and mix with size. Raw umber will make a drab of a different shade.

ANOTHER. Dissolve separately some whiting and yellow ochre in water. Take a proportionate quantity of each, and mix them together till a bright yellow is produced. Grind a little lamp-black very fine in vinegar, and with it sufficiently stain the color to form a drab; another shade may be obtained by adding a little Venetian red. Thus, by diversifying the proportions of the above-mentioned pigments, a great variety of shades may be produced.

Brilliant Peach Blossom.

Orange lead (orpiment) and whiting when properly mixed, composes a beautiful and unfading color; it is much used by paper stainers. Dissolve whiting in water; then grind very fine in water a small quantity of orange lead and mix with the whiting; add sufficient size to the mixture, and strain it through a sieve, and put it into a cool place till fit for use. This color must be worked in a jelly, as the orange lead is heavy, and would otherwise separate from the other parts and sink to the bottom in its pure state.

Excellent Green for Walls.

Take two pounds of mineral green, and six pounds of good green verditer; mix them together, and grind in water; mix with size, and work the color when it has formed a jelly. This green has a good body, and is very durable.

Another. Mix a solution of common salt and blue vitriol in water; by putting copper plates therein, a green precipitate will be gradually formed, which may be mixed with whiting, and then spread on a board to dry.

Another—Good and Cheap. The following color must not be allowed to come in contact with *iron*, as the vitriol powerfully attacks it and thereby spoils the color.

Take eight pounds of blue vitriol (sulphate of copper), and two pounds of whiting, boil them in a brass or copper kettle, in three gallons of water, one hour, stirring the mixture the whole time till thoroughly dissolved. Pour it into an earthen pan, and let it stand several days. Decant the water, and mix the sediment with size; apply it to the walls with a whitewash brush. The shade may be altered or improved by adding a little Dutch pink or chrome yellow. When required for use, it must be dissolved in water, mixed with size, &c.

Blue Verditer.

The best blue in use for distemper colors on walls. Dissolve some pieces of copper in aquafortis, and when dissolved, produce a precipitation of it by adding quick lime, in such doses that it will be entirely absorbed by the acid. In order that the precipitate may be pure copper without any mixture, when the liquor has been decanted,

wash the precipitate, and spread it out on a piece of linen cloth to drain. If a portion of this precipitate, which is green, be placed on a grinding stone, and a little quick lime in powder be added, the green color will be changed into a beautiful blue. The proportion of lime added is from seven to ten parts in a hundred. As the whole matter has already acquired the consistency of paste, it soon dries. It is cheaper to buy the verditer than it is to make it.

French Gray.

Whiting predominates in this color; it is treated as the other grays, but with this difference, that it admits of lake instead of black. Take the quantity, therefore, of whiting necessary, and soak it in water, then add the Prussian blue and lake, which has been finely ground in water. The quantity of each of those colors should, of course, be proportioned to the warmth of color required. This is a handsome and delicate color for walls. Either of the preceding grays will answer for the first coat, as the French gray will cover upon it very well. Rose pink may be substituted, but it does not make so brilliant a color, neither is it so durable.

Salmon Color.

An excellent salmon color may be made by dissolving whiting in water, and tinging it with the best Venetian red, finely ground in water. A little Venetian red mixed with lime whitewash, and a proportionate quantity of alum, will answer very well for common purposes. It is important, when Venetian red is required, that you

obtain it genuine, as a spurious article is frequently sold for it, which, when used, spoils the intended effect when applied to fine work.

Straw Color, in Size.

Dissolve the necessary quantity of whiting in water, then grind in water some chrome yellow or Dutch pink. Mix to the shade required, and add some strong size. Strain the color through a hair sieve, and set it in a cool place till fit for use.

Buff.

A good buff may be produced by dissolving separately whiting and yellow ochre in water. A little Venetian red must be added to give the yellow a warm cast. Mix with size, and strain as before directed.

Orange Color.

For walls and stables. Use two pounds of green copperas, dissolved in hot water, just sufficient to dissolve it. Mix it well with eight gallons of fresh lime wash. Stir it well while using.

Another. A mixture of whiting, yellow ochre, or Dutch pink and orange lead. These ingredients may be proportioned according to one's taste. This color cannot be worked except in a size jelly, as the orange lead is a color which has great body.

Pink.

Dissolve in water separately, whiting and rose pink, mix them to the texture required; strain the color through a sieve, and mix with size.

Lilac.

Take a small quantity of indigo finely ground in water, and mix it with whiting till it produces a dark gray; then add to the mixture some rose pink. Well mix and strain the color, and a beautiful lilac will be the result.

Light Gray.

A small quantity of lampblack mixed with whiting composes a gray, more or less black, of course, regulates the shade. With whiting, therefore, mixed with black in varying proportions, a wide range of shades may be obtained, from the darkest to the lightest gray.

Blue in Distemper.

A good blue is made by dissolving whiting in water and mixing some indigo with it.

LIME WHITEWASH.

Lime whitewash is made from lime well slacked. Dissolve two pounds and a half of alum in boiling water, and add it to every pailful of whitewash. Lime whitewash should be used very thin, and when it is sufficiently bound on the wall by means of alum, two thin coats will cover the work better; this may be used for the first coat, thinned with water. Most whitewashers apply their wash too thick, and do not mix a proportionate quantity of alum to bind it, consequently the operation of the brush rubs off the first coat in various parts and leaves an uneven surface, and the original smooth surface of the wall is entirely destroyed.

For Out-door Work.

Eight ounces of lime newly slacked, by dipping it in water, and allowing it to break down in the open air. Now take two ounces of Burgundy pitch, and dissolve by a gentle heat in six ounces of poppy or linseed oil; then add to the hot lime two quarts of skimmed milk while in a hot state. Add the mixture of pitch and oil a little at a time, stirring all the while. Lastly, add three pounds of powdered whiting.

WALL PAINTING.

Generally speaking, hard-finished walls are left for a year or two before they are painted in ordinary houses. Previously to painting they are sand-papered moderately. When this is the case, three coats are generally sufficient. The first coat, not too thin, and well rubbed in. This should be a flat coat and left to dry. The second coat should have more oil than the first, and every square yard of the work should be struck with the points of a square brush before the color sets. This gives that agreeable roughness to the wall surface which is now the style. The third coat should be a dead coat, also struck with the points of the brush as before. This makes a handsome wall—not shiny—clean, and washable when soiled.

If the walls are new, it is expedient to give either one coat of boiled oil, or a coat of drying paint first, and then a coat of thin size. This prevents the subsequent showing of spongy spots in the wall. After this, one coat of paint, not flat, struck with the brush as above, and then, when this is dry, a finishing coat of that color, also struck with the brush.

It is not customary to *paint* ceilings when it is desired only to have them in *plain* colors; kalsomining is usually deemed sufficient in such cases.

The colors for walls are few, French gray being preferred in general to any other, as it is a cool looking color, and picture frames and high-colored furniture, &c., all look the better for this neutral background.

To Prepare Damp Walls for Painting. One pound of good glue dissolved in one gallon of water, and thickened with red lead; to be brushed on while hot.

To Kill Smoke on Walls. Walls, if almost black, and very smoky, must be brushed as clean as possible with a broom, and in order to kill the smoke, wash them over with strong pearlash or soda water, and immediately rinse them with clear water before the pearlash is dry. When dry, give them a thin coat of fresh slacked lime, with a good proportion of alum dissolved in hot water and mixed with it. The work should be finished with whiting and good glue size. Be careful not to apply the size distemper till the lime-wash is dry, as the latter will destroy the strength of the size if they come in contact while wet.

To Prepare Smoky Rooms for Painting. If there is a smoky gloss on the part intended to be painted rub it off with sand paper, and whitewash over with newly-slacked lime. When this is dry brush it off clean, and well scrub the work with strong pearlash water, and afterwards rinse it well with clear water; finish by giving it a coat of weak size, with a little whitelead powder mixed with it, or dissolve alum in hot water and brush on.

Shellac on Walls. Where stains are very troublesome, a thin shellac varnish may be used as first coat previous to kalsomining or painting.

STAINING.

Pine, poplar, &c., may be stained in imitation of the various kinds of finer woods, and, when well done, much resembles the natural woods. Previous to staining, give a coat of glue size. A very good and cheap method of

MAHOGANY STAIN is to boil one pound of logwood in four quarts of water, and add a double handful of walnut peelings. Boil again, take out the chips, and add one pint of vinegar. This does best for beech wood.

ANOTHER. Grind burnt sienna in ale or vinegar; make it thin; spread on with a brush, and while wet, it may be grained and shaded with the same, thickened up with more sienna.

BLACK WALNUT. Work the same as above, using burnt umber.

YELLOW STAIN. Grind and mix with ale or vinegar, aloes or gamboge; or, make a stain by boiling curcuma in water.

CHERRY STAIN. Good venetian red and glue water is quite as good a stain as the various decoctions, and less trouble and expense. A decoction of red sanders is sometimes used.

Remarks. — All tools may be obtained in the paint and drug stores by the names they are called throughout this work.

Glazing is a thin, transparent color, mixed up thin, and spread thinly over grained work or other ornament, for the purpose of giving the work more depth.

Where work is to be glazed, there is always more contrast in the lights and darks of the under work.

Principles of Glass Staining.

This beautiful branch of the art is quite too much neglected. The gorgeous display that may be made, and that has been so successfully done by some artists, is sufficient to excite the desire to bring it into more general use. One can conceive of no more beautiful method of ornamenting the windows of churches and public buildings, or, in fact, anything in the way of ornamenting on glass. The following method is the one now in general use. Before engaging in this, it would be better if the artist could get some little previous instruction. We will endeavor to give the correct principles in regard to the oven, the baking, the colors, and the manner of making and using them.

THE OVEN is made of fire brick, and arched over like a common bake oven. This is to admit of an iron chest, or muffle, as it is called, so close on the outside that neither fire nor smoke can penetrate, and about three or four inches less than the oven, so that there may be an equal space at the top, bottom, and sides, with legs to keep it from the bottom.

The sheet of glass to be worked upon (the softer the glass the better) should be spread over with gum water, and let dry, in order to prevent the colors from running together, it being also much better than the slippery glass to work on. After it is dry, lay it down evenly upon the design, which has been previously sketched upon paper, and trace, with a fine hair pencil, all the outlines and shades of the picture or ornament with black. [See the mode of the preparation of colors at the end of this article.]

THE LIGHTS AND SHADES are produced by dots, lines, and hatches, very much after the manner of the engraver. When this is finished and dry, it is ready for the

Floating. Take the prepared colors and float them on by dipping the pencil in the color, and taking it, as full as it will hold, to the glass, and just near enough so that the mixture will flow out upon the glass, care being taken that the pencil does not touch the glass, as it leaves a spot. This refers only to transparent colors.

Taking out the Lights. The methods of doing this, after the color is on, are various. Perhaps the best way is to take a goose-quill, made in the shape of a pen, without the slit. With this the artist may take out the lights by dots, lines, &c., to suit his taste. It is then ready for the kiln or oven.

Over the bottom of the oven, or muffle, must be spread, about a half inch thick, a bed of slacked lime, perfectly dry, and sifted through a sieve. Upon this lay a sheet of glass, then another layer of lime, and so on, if desired, for half a dozen sheets, though for very fine work, and where uniformity of coloring is required, it is better to have a less number. There may be quite a number of iron slides in the muffle, so that a number of glasses may be burned at one heat, without having more than one or two upon each slide. Close the muffle and raise the fire; but gradually, or the heat will break the glass.

After it is got up to a red heat, it may remain so for two, three, or four hours, according to the tests, which are strips of glass, painted with the same colors as the sheets, and drawn out occasionally. When the colors are properly burned in, the fire may die away gradually, as it was raised. When cold, the glass is taken out and well cleaned.

The chemicals mentioned in the following preparation of colors, may be had at most of the first-class drug stores. These preparations should be combined, so that each shall require about the same amount of heating to bring out the color.

Colors for Staining Glass.

Flesh.

Red Lead, ... 1 ounce.
Red Enamel, . . . 2 ounces.

Grind to a fine powder; work it up with alcohol, on a lag stone. Requires slight baking.

Black.

Iron scales, ... 14½ ounces.
White Crystal Glass, . . 2 ounces.
Antimony, ... 1 ounce.
Manganese, ... ½ ounce.

Pound fine, and grind in strong vinegar.

Brilliant Black.

Made to any degree of depth by the mixture of cobalt with the oxides of iron and manganese.

Brown.

White Glass, ... 1 ounce.
Manganese, ... ½ ounce.

Rich Brown.

Oxide of Platinum.

Red.

Red Chalk, ... 1 ounce.
White, hard Enamel, . . 2 ounces.
Peroxide of Copper, . . . 1 drachm.

Fine Red.

Rust of Iron, . . . 2 ounces.
Glass of Antimony, . . . 2 ounces.
Litharge, ... 2 ounces.
Sulphuret of Silver . . . ½ drachm.

Green.

Brass Dust, ...	2 ounces.
Red Lead, ...	2 ounces.
White Sand, ...	8 ounces.

Calcine the brass to an oxide, and make all into a fine powder. Heat in a crucible one hour, in a hot oven. When cold, grind in a brass mortar.

Green. Oxide of Chrome.

Green. Blue on one side, yellow on the other.

Yellow. Fine silver, dissolved in nitric acid. Dilute with plenty of water. Pour in a strong solution of salt, and the silver, in the form of chloride of silver, will fall to the bottom in a yellow powder. When settled, pour off the fluid; fill up with water; when settled, pour off again, and so on for five or six times. When dry, mix the powder with three times its weight in pipe clay, well burned and pounded. Paint on the back of the glass.

Yellow. Sulphuret of silver, glass of antimony, and burnt yellow ocher.

Yellow. Chloride of silver, oxide of zinc, white clay, and rust of iron.

It is by far the best method to buy the colors, if possible, ready prepared. Some, however, *must* be manufactured by the artist. Among them are, —

Blue. Oxide of cobalt, which is cobalt ore, after being well roasted, is dissolved in diluted nitric acid. Add considerable water, and pour into it a strong solution of carbonate of soda. A carbonate of cobalt is thrown to the bottom in a powder. Wash well, as for chloride of silver, and let dry. Mix this with three times its weight of saltpeter. Burn this mixture in a crucible, by putting a red hot coal to it. Heat, wash, and dry it. Three pints of this to one of a flux made of white sand, borax, saltpeter, and a very little chalk, melted together for an hour, and then

ground into an enamel powder for use. Any shade may be had by more or less flux.

VIOLET.

Black Oxide of Manganese, .	1 ounce.
Zaffer, ...	1 ounce.
Pounded White Glass, . .	10 ounces.
Red Lead, ...	1 ounce.

Mix, fuse, and grind.

Remarks. — The fluxes are made of flint glass, borax, pipe clay, white sand, &c.

The principles of glass staining, and making the colors, therefore, will be found of great service to beginners; yet it must be understood that the practice will be very difficult, without some practical instructions; yet, one who has a taste, and some scientific ability, may be enabled, by studying these rules closely, and by a few trials in experimenting, to succeed in producing the work properly.

Rules for Measuring Painter's Work.

In regard to measuring work, it is generally understood that the measurer's judgment must be exercised to a great xtent. Hence, all work that may not come under any of hese heads, must be left entirely to him.

The following rules are given as sort of landmarks, and are intended to aid the painter not only in the measurement after the work is finished, but in making out bills and propositions for work, and they will also enable him to guess at the value of a job. The price, however, or the amount of deduction on this full bill, may be made according to the prices of material and wages; for at some seasons both wages and material, as also living, are much cheaper than

others, consequently a per cent. on or off the bill may sometimes be necessary.

Prices per Square Yard.

Common Cheap Colors, —	
First coat,	10 cents.
Second coat,	5 cents.
Third coat,	4 cents.
Fourth coat,	4 cents.
Blues, Chrome Yellow, Light Green, —	
First coat,	14 cents.
Second coat,	10 cents.
Third coat,	7 cents.
Fourth coat,	7 cents.
Dark Green, Emerald, and other Costly Colors, —	
First coat,	16 cents.
Second coat,	14 cents.
Third coat,	9 cents.
Fourth coat,	8 cents.
Sanding,	8 cents.
One coat over the sand,	14 cents.
Second coat over the sand,	9 cents.
Oiling brick,	6 cents.
Penciling brick,	12 cents.
Painting on Brick, —	
First coat,	18 cents.
Second coat,	10 cents.
Third coat,	8 cents.
Fourth coat,	8 cents.

Other costly colors, per yard, extra, from 8 to 15 cents, according to the cost of the color and roughness of the work.

Graining, per square yard, for fair jobs, $1.00; varying, however, according to the amount and quality of labor, adding or deducting 50 cents.

Polishing, per square yard, 60 cents.

Puttying, for all work, add 5 per cent.

Sand-papering and cleaning, 5 per cent.

Girthing or Measuring.

Plain cornices, boxing, &c., girth once and a half, or one half its measurement added.

Block and dentile, or other equivalent ornament, once, twice, or three times its measurement added, according to the difficulty of the labor.

All other ornament, difficult to paint or to get at, measure from once to five times its real girth.

Barge boards, water spouts, gutters, &c., measure three times.

Paling and railed gates, measure and a half, that is, three heights, besides girthing the rails and posts of the railing, if done with one color; but if the pales are topped with another color, one foot extra.

All stone facias, window and door arches, and sills, double.

Window and door frames, in and outside, double.

Venetian shutters, double the measure of plain work.

Post and railed fences to be girthed both post and rails, and one half more added to the girth.

Window bars shall be measured square. Window sash the same, if done with one color; but if done with two, they shall be double measure.

Corner strips on frame houses, if painted with a different color from the weather-boards, to girth double.

Rough weather-boarding and old roofs, double measure.

Oiling and penciling on brick work shall be measured

square, and on dead walls, from one fifth to one third added to the measurement.

Balusters (either inside or outside), to be measured three sides; if the hand rail is capped with a different color, one foot more to be added.

Corner strips, corner beads, and single architraves, double; double architraves, girth three times.

Pilasters, two or three times.

String boards to girth twice.

Wash boards, base boards, &c., double; capped with another color, six inches added.

Mouldings, measure twice and three times, according to work.

Base, or stair-case, twice and a half.

Panels, to be allowed two inches in height and breadth for each panel; but if the panels are done with one color and stiles of another, measure and half; if the mouldings are done with another color, double measure.

Edges of plain shelves, three inches girth; beaded or otherwise, from three to six inches girth.

Painting on plastering shall be measured square, and the openings deducted; making suitable allowance for cutting edges, and one third added to the measurement.

Sizing the walls of plastering, three cents per square yard.

All beads or grooves, too narrow to measure, one inch added for each.

All picked out work, to be valued according to trouble.

All work not herein expressed, to be measured according to the judgment of the measurer.

Rules for Measuring Brick Work.

All painting on brick shall be measured square, and the openings deducted, that is to say, the actual opening which the sash or door occupies, allowing the thickness of the door or window-frames to make up for the reveals; if the frames or reveals are of an uncommon thickness or depth, a proper allowance shall be made by the measurer. If the stone or brick caps or arches are or are not painted the same color as the wall, there shall be no change from the above rule; but if they are painted with a different color, they shall be called from one to two feet girth, the price to be according to color, and number of coats of that color. If the stone sills are done with a different or with the same color as the wall, they shall be called from one to two feet girth, according to color and number of coats. Stone or brick facias and water-tables, if done with the same color as the wall, they shall be measured in with it; but if painted with a different color, they shall be measured the same as stone sills, &c.

N. B. No reference is to be had to the above rules for measuring stone facias, &c., where the walls are not painted

Prices for Glazing.

Prices for glazing new sash, and furnishing the putty:

8 by 10, per light, . . .	4 cents.
9 or 10 by 12, per light, . .	6¼ cents.
10 by 14 or 15, per light, .	8 cents.
11 by 15, per light, . .	9 cents.
11 by 16, per light, . . .	10 cents.
12 by 16 or 18, per light, .	12½ cents.
14 by 20, per light, . . .	16 cents.
16 by 22, per light, . .	20 cents.

When the glazier furnishes the glass, the usual retail prices shall be charged. If there is a percentage taken off the bill, the charge for the glass shall not be subject to it.

When the glass is bedded, the glazing shall be doubled. If back-puttied, price and a half.

Prices for glazing old sash, and furnishing the glass and putty:

8 by 10, per light, . . .	12½ cents.
9 or 10 by 12, per light, . .	18¾ cents.
10 by 14 or 16, per light, .	25 cents.
11 by 15, per light, . .	31¼ cents.
11 by 16, per light, . . .	37½ cents.
12 by 16 or 18, per light, .	50 cents.
14 by 20, per light, .	$1.00.
16 by 22, per light, . .	$1.25.

When the glass is furnished, the usual retail prices shall be deducted from the above. If there is a percentage taken off the bill, the charge for the glass shall not be subject to it.

Prices of Sign Painting.

Lettering is measured running measure, measuring the length of each line of letters, without regard to their heights.

Plain letters, per foot, . .	30 cents.
One shade, add . . .	10 cents.
Double shade, add . . .	20 cents.
Gold letters, per foot, . .	$1.00.

Shading, the same as other letters.

Other fancy and ornamental letters and shading, shading on the surface of the gold, add according to labor, being guided by the standard.

Japanned tin, in gold, running measure, per inch, 7 cents.

Shading, per inch, 2 cents.

Lettering on glass, running measure, per inch, 7 cents.

Colored letters on glass, tin, stone, or other columns, and all small boards, running measure, per inch, 3 cents.

Dashes and other plain ornaments, measured as letters.

Gold borders, per square inch, 3 cents.

In gilding plain surfaces, the labor is equal to the cost of the gold. Ornaments in proportion to the labor.

These rules will serve as a guide in proportioning the prices to the amount of labor. It would take a volume to adapt a full list of prices to meet every variety of lettering and ornamenting; and these prices may be considered as a standard, subject to being modified to suit the amount of cost and labor.

A TREATISE ON PAPER HANGING,

In which the Practical Operations of the Business are laid down, with Plain Directions preparatory to Hanging all Kinds of Paper and Wood Hangings,

Preventive Against Damp on Walls,

The Different Kinds of Pastes, Size, Cements, &c., adapted to the Several Purposes of the Trade; and Directions for the Paneling and Ornamentation of Rooms, &c.

BY THOMAS LINN, A PRACTICAL WORKMAN OF FORTY YEARS' EXPERIENCE.

MY plea for presenting this little treatise is, that there is at present no work of the kind which gives to the million any idea of this business, and that I think I shall do a good work by presenting in this form a guide to any one of average capacity to hang paper properly. I do not wish the public generally to think that the operation consists in the mere sticking of paper on the wall, for the professed paper hanger is aware of the many difficulties which present themselves from various causes, and which have to be surmounted before the walls or grounds are in a fit state to receive paper; this, in these fast days, is too frequently neglected. A great many think that almost any person who can be engaged at low wages can do the work cheaper and as well as a professed workingman; but a little reflection and experience will soon teach them that a good paper hanger will do the work in half the time, make less dirt, waste and cost than the slap-bang innovator.

In the following treatise I have endeavored to explain clearly the requisites for each department of work.

The few remarks on coloring in distemper and varnishing paper will, I hope, be considered worthy of notice. In conclusion, I beg to draw attention to that part of the book relating to the care required in the management of hanging crimson-stained ground papers, forty inch, plain tints, stamped gold, wood hangings, etc.

Tools for Paper Hanging.—The tools required are few and well known, but as some of them will be referred to, I will insert them here. Overalls (with bib, large pocket across, long and narrow pocket for rule, and open slide for shears), long trimming shears and wet shears, straight edge, paste board, plumb-bob, rule, paper brush, paste brush, paste pail, size kettle, step-ladder and roller.

Before commencing, have ready some pumicestone sand paper, a basin of cold water, and two or three soft towels; I recommend the using of the large round brush for pasting, as it takes up the paste cleaner and more readily, and can be turned in the hand easily; the paper brush I only use on soft, light paper, which cannot be handled much; on forty inch tint, etc., always use the roller.

Pastes for Paper Hanging.—It is well known that it is impossi-

ble to make good adhesive paste of any other than good sound wheat flour. It is perfectly useless to try any other. Much has been said of various substitutes, but I never heard of any success in their use.

Much more depends on the proper adaptation of the kinds of paste to the several purposes to which they have to be applied than is taken into general consideration.

Many who attempt paper hanging use one kind of paste for all purposes, without regard to circumstances; but as I am of the opinion that much depends on the application of suitable paste to certain walls and paper, I shall give those which I have found to answer best in cases where they have been applied.

No. 1 is the paste as generally used, and will answer for most papers, the quantity is sufficient for a day's work. Beat up four pounds of good white wheat flour in cold water—enough to form a stiff batter (sifting the flour first); beat it well, to take out all lumps; then add enough cold water to make it the consistence of pudding batter; add about two ounces of well pounded alum. Be sure and have plenty of boiling water ready; take it quite boiling from the fire, and pour gently and quickly over the batter, stirring rapidly at the same time; and when it is observed to swell and lose the white color of the flour, it is cooked and ready.

This will make about three-quarters of a pail of solid paste; do not use it while hot; allow it to cool and it will go further; you may put about a pint of cold water over the top of it, to prevent it skinning; before using, thin this with cold water to spread easily and quickly under the brush. This paste will keep a long while without fermenting, when it is useless; mold on the top does not hurt it; remove it, the remainder is good.

No. 2. This paste is made the same as No. 1, with the exception that no particle of alum is used.

No. 3. This paste is seldom wanted, except where great adhesiveness is required. In a kettle or iron pan of suitable size, mix flour with cold water in the same manner as in No. 1; make the batter of much less consistence, and to two quarts of batter add half an ounce of pounded rosin. As the rosin does not dissolve so readily, set the pan containing the ingredients over a moderate fire, constantly stirring until it boils and thickens, and a short time after put out to cool.

As some adhesive liquid is required to reduce its consistence, I would recommend a thin gum arabic water as the best. This paste is indispensable in papering over varnished paper or painted walls.

No. 4. This paste is made in the same way as No. 3, without the gum, for the reasons already explained.

Sizing for Walls.—Walls that have been whitewashed or colored require sizing and scraping. It is hardly necessary for me to explain that size is simply glue and water; for ordinary purposes the common black glue is sufficient; for sizing paper preparatory to varnishing, the best German white glue is necessary. In making size, take your glue and soak over night in cold water, and then add hot water until dissolved.

Preparation of Walls or Grounds.—It is highly essential to the attainment of neatness and perfection in paper hanging that the walls or grounds should be in a proper state to receive it; there are few things either in art or science that do not require a sound and clear foundation, and the preparation for paper hanging is no exception to that rule.

In White or Colored Walls in Distemper.—As I said before, those walls that are whitewashed or colored require a very careful preparation. Some rooms have been whitewashed so often that one coat on another has amounted to the thickness of a coat of plaster. All this must be removed by damping and scraping. Care must be used to indent the walls as little as possible, as the blemishes will not be hidden by the paper.

Observe particularly that the top, bottom, and angles are well scraped; after filling all inequalities with plaster of Paris, wash over the walls with hot size, and they are ready.

Plaster of Paris is a very useful article for the paper hanger, merely mixing it with water, and applying to all holes. It is the best thing I ever used, as it does not contract in drying.

On the Preparation of Grounds Affected with Damp.—Damp is one of the worst things with which a paper hanger has to contend, and a great many means are resorted to for overcoming it. The following are among the best:

No. 1. Wall metal; No. 2. Battening for lath and plaster; No. 3. Battening and canvasing; No. 4. Strong brown paper; No. 5. Ivy on outside walls. Of these, the surest plan is battening for lath and plaster; but as it is attended with much trouble and expense, it is seldom used. This is a plasterer's work, and, as it is well known, it is useless to describe it.

Battening and canvasing is a very good method. The wooden plugs or battens must be made of good hard wood, and driven well into the wall; they must be placed close to the top, bottom, and windows, and fire-place, and double, to form a right angle at each of the corners; then cut, and have your canvas back-stitched in sizes that each piece may cover a side or end; stretch and tack on the battens with tinned tacks; use very stiff paste over canvas work.

Wall metal, or sheet lead, is very good. It can be used to good advantage on parts of walls, as some lower sides next an alley, etc. As it is made now, it can be evenly pressed on the wall with strong paste, No. 1.

Strong brown paper is next best for damp walls. It is made at the mills, of immense size. When using, cut off the rough edges, and wet it well with water; let it stand until soft and pliable. As it is mostly in demand for parts of walls partly damp, or to level the unevenness of walls, it should be put on with tinned tacks, as others rust and show through fine papers.

Ivy on Outside Walls.—This preventive of damp is not in a paper hanger's line; but as I have had some experience in it, I give it. I found that on walls that are affected with damp, if

ivy or some close leaved plant is grown so that its close overhanging leaves prevent the rain and moisture from permeating the wall, in a little time it will leave the wall inside dry.

On Hanging Common Papers.—Having given the remedies for the various obstacles which present themselves, I will give a few plain directions to hang paper after the wall is properly prepared and the tools in order. Trim the paper close to the pattern on one side, and within one-eighth of an inch on the other for a lap; measure the number of breadths required, and cut from your pieces, leaving remnants for over doors and windows; then commence hanging. Try and begin at a bead or where it will not show when you stop; the bead down the left side of the mantel is the best place. Work all papers to the left, and in hanging they will always be on your right and can be easily cut and fitted in the angles as you proceed. Try and make the lapping joint face the light so that it may not be seen. Many striped and formal patterns require uniformity; always make them center over the mantel and between piers. My method to do this is to cut a slip of paper of the size of the mantel and try it across the paper until you strike that part of the pattern that will come the same on both sides; then cut off each breadth on each side enough to make the part measured come on each side.

On Pasting Paper.—Lay your breadths carefully on your table, and bring the first piece just to the edge. Have your paste pail and brush at your right hand, and take a brushful of paste and begin from left to right. Double over the paper and pass to the left, and finish and double the balance. You should observe to fold the longest part to commence with at the right top, for the obvious reason of having your breadth plumb and matching the pattern. With borders it is well to paste double and cut after pasting; it is the fastest way.

Lining Paper.—Lining paper is, in most cases, to be recommended as a ground for delicate paper hangings. It adds much to a soft effect, also making an evenness to a wall, a quicker absorption of the paste, the want of which is frequently injurious to stained grounds. It is to be had at the mills in large rolls cut off in breadths the same as the paper. Hang without lapping.

Hanging Flock Papers with Crimson Stained Ground.—I believe that this kind requires more care and attention than any other, therefore I hope my method will be acceptable. These papers are subject to discoloration even by trifling mismanagement. Pastes Nos. 2 and 4 must be used. Have them in separate vessels, with a brush to each; as great adhesiveness is only required on the lap edge, paste it with No. 4, the rest of breadth with No. 2. The advantage of this system will be obvious to a paper hanger. He will know that this paper does not require a quantity of strong paste. All joints must be cut with a sharp knife. The edge must butt, as in forty-inch tints. Be careful to take off with your knife all the little pips or marks of

flock projecting beyond the pattern. Gold molding is the only suitable border.

Paneling.—For effect in panel work much depends on taste, and often the workman is directed by the owner or employer; but he should know how to produce certain effects. Where the fireplace, doors, and windows are situated about uniformly in a room there is no difficulty to decide. Make your styles and vails in a regular size according to the height of the room; to a ten-feet room, say about six-inch vails, etc; to a room to be done in wood, make rosewood style and light oak centers with suitable moldings and reverse according to taste. Another mode of paneling is to make each side in one panel where the doors and windows are not alike; this is an excellent plan. In all apartments of a paneled room there should be a full panel, and the greatest nicety should be observed in centering the pattern in the panel, for where pictures are to be placed in them the least deviation from uniformity will be seen and it is displeasing to any critical eye. As before stated, be careful to have the laps toward the light.

Wood Hangings, Forty-inch Tints, Stamped Gold, etc.—Of wood hangings I would not recommend a general use; they will not answer on a whole room, but I have found that some woods, the soft maples, cedar, birch, etc., make very pretty and durable work. My secret for applying them is as follows: Have your wood cut to the right size, and then with a soft sponge apply glycerine; let it stand over night and the woods will be as pliable as paper; then apply to the walls with paste No. 3; rub down with wooden scraper. On forty-inch tints and wood papers I would always have two workmen pasting with paste No. 2. I have found these papers to stain when one is pasting, on account of not being able to apply the paste evenly. The same remarks apply to stamped gold, etc. One of the best plans I have found to trim plain tints and stamped golds is, that having no pattern to cut, to drive an awl through the piece and trim by the small holes made; drive the awl within an eighth of an inch of the end of the piece. Always apply these papers with paper hangers' rollers made of wood with cloth covering. I find it a good plan, when butting the edge of plain tints, to roll the edges with a bed castor, which will effectually prevent any seams from being seen.

Cautions to Paper Hangers.—Poisonous Paper, etc.—It is needless, I think, to caution any good workman against using paste and refuse to fill holes in plastering, preparatory to papering. This has caused severe illness to occupants of the room. The common plan of papering over old paper, in some cases many layers, is bad, as mold is apt to result. Formerly all green papers were objectionable on account of the arsenic. Now aniline has taken its place in some of the green papers, but flock or velvet papers are injurious not only on account of the color being poisonous in some cases, but also owing to the dust which comes off into the air.

Sign, Carriage and Decorative Painting.

SIGN PAINTING.

SIGN PAINTING is an art of a very exalted character, and when brought to a state of perfection, viz., true coloring, fine, accurate divisions, and proportions duly balanced, it is entitled to rank with fresco and landscape painting. Indeed, I know of nothing more pleasing to the eye than a sign where all the requirements are brought to bear in perfect unison—"a true sense of color in contrast"—a sweet harmony of tone, a chasteness of composition, upon which the senses can rest with entire satisfaction. These are the points which we wish the reader and learner to attain, and which we shall strive to make intelligible and clear. Too many men learn and hoard up, like very misers, and too many die with the gainings of a lifetime locked in their bosoms, rather than give such knowledge to benefit those who succeed them. And it may reasonably be supposed that the arts and sciences are scores of years behind what they would have been but for this very selfishness.

In everyday practice how often do we see attempts made at sign painting by those who, through ignorance of the first and most essential principles, who know nothing about the true method of preparing grounds, the proper proportioning of the letters, the divisions of distances, parallels, contrasts of color, and other requisites to a good or attractive sign; how often have we seen such signs attempted and become objects of ridicule, even among people who knew nothing of the business themselves? An artistic sign is attractive in more ways than one, and an unartistic one is agreeable to none.

Before entering upon the general outline of procedure, it will be well to give an outline of the nature and properties

of colors employed in sign painting, together with the oils, sizes, varnishes, &c.

COLORS.

RED VERMILION.—This is a bright scarlet, a chemical compound of mercury and sulphur. The best article now in the market is of English manufacture.

RED LEAD.—This is an oxide, of orange tinge, very liable to turn black.

INDIA RED.—This is an ochre, brought from the East Indies; its shade inclines to purple. It works freely and stands well.

COLCOTHER.—A red oxide of iron. It is often called "Indian Red," which is wrong. It is obtained by the distillation or calcination of sulphate of iron. The fine color inclines more to the scarlet than the purple. It stands well.

VENETIAN RED.—A native ochre combined with iron. When well washed, to free it from its sandy particles, is a fine, mellow, pleasant red. It is very useful, and stands well.

RED OCHRE.—Is yellow ochre calcined as deep as the iron it contains will oxidize. A very useful color for shading in gold signs, etc.

CARMINE.—The most valuable of that class of colors, being the heaviest body-color obtained by the manufacture of lake. It is made from cochineal, precipitated by solution of tin; or the best lake from madder, by Sir H. Englefield's process.

CHROME YELLOW.—This is a chromate of lead, and is prepared by the following process: Take a solution of chromate of potash in hot water and add another solution of acetate of lead (sugar of lead). If wanted very pale use a little nitric acid; and if dark shades are required, use bi-carbonate of potash, and by the addition of a few drops of muriatic acid you can deepen the tint down to orange.

NAPLES YELLOW.—This is prepared by lead and antimony. It is much used and stands tolerably well, although of but little use to the sign painter.

YELLOW OCHRE.—This color is a native earth. Some specimens are very bright, and all are durable in oil and work freely.

TERRA DE SIENNA.—This is a brighter and deeper yellow than most of the other ochres. It is found principally in Italy, and is a valuable color.

TURPITH MINERAL.—This is brighter in color than any other yellow, except king's yellow. It works like vermilion, which it greatly resembles in strength of color, etc.

KING'S YELLOW.—Is a combination of sulphur and arsenic. It is a strong poison, but has a deep, rich color, although not durable.

BLUES are principally composed of sulphate of iron and prussiate of potash. These blues are generally called Prussian blue, Antwerp blue, celestial blue, etc. They are all of a fugitive character in oil.

ULTRAMARINE.—This is the richest and brightest of all blues, but is too expensive to be used in house, sign, or ornamental painting, costing usually about twenty-five dollars per ounce. But a very good and cheap substitute has been discovered, manufactured from carbonate of soda, sulphur, cobalt and kaoline. It works well and is durable.

COBALT.—This is the oxide of cobalt, but its manufacture is too complicated to describe in this little work. It is a beautiful shade of blue, and both works and stands well.

GREENS.

BRUNSWICK GREEN—is copper dissolved in a solution of muriate of ammonia. It is a good, pure green and stands well.

CHROME GREEN.—Green chromium is a compound of bichromate of potash and flower of sulphur, but the manufacture is too intricate to find a place here. It is a rich and splendid green. Chrome green, formed by a union of chrome yellow and Prussian blue, can be made of any shade by using more or less of one or the other of the colors. They are very durable.

VERDIGRIS.—Copper reduced by a vegetable acid. It can be used by the addition of a little chrome yellow. It stands well, and is a good color for shading, etc., being transparent.

A beautiful transparent green can be made as follows: Pulverize sugar of lead and blue vitriol (sulphate of cop-

per), then put the two dry powders together; mix them well with the knife on a marble slab or glass. The vitriol and lead, more or less of either, varies the color, making it brighter or darker. This is a beautiful green for glazing gold, or anything requiring a transparent tint. It is durable.

SCHEEL'S GREEN.—Arseniate of potash and acetate of copper. Beautiful, but poisonous, and should at all times be used with extreme caution.

EMERALD GREEN.—A composition of yellow arsenic and verdigris. A most malignant poison. I have known painters to spit blood after merely mixing and grinding forty or fifty pounds of that mineral, and the taste would not leave the mouth for days. Avoid such a color as you value your health.

WHITES.

FLAKE WHITE.—The best formerly came from Italy, where the acid of the grape was employed in the manufacture, instead of commou acetic acid. It is a pure white but liable to change. The flake white made in England and Germany retains its purity to the end.

KREMMTZE WHITE.—This is simply white, corroded in a small scale in "chambers" instead of being done in "stacks," the old Dutch method. It must consequently be free from any sulphate of hydrogen or ammonia, and hence its superiority over the others.

ZINC WHITE.—An oxide of that metal, the result of combustion, commonly called "chemical wool." It is a beautiful white, not quite so full in body as white lead, but possessing no affinity for either sulphide of hydrogen or ammonia, or any other of the obnoxious gases. It retains its brilliant whiteness longer than any white pigment known, with the exception of a white prepared from antimony, which has, however, never as yet become an article of commerce.

BLACKS.

LAMP BLACK.—The soot collected from burning animal or vegetable matter. It should always be calcined before using, as it will then dry better and make better color.

IVORY BLACK.—This beautiful black is prepared by the calcination of ivory and bones in close vessels. It is the purest and most valuable color in the sign painting business.

BROWNS.

UMBER.—The Turkey umber is the best; the English is rated second. They are good drying colors. In their raw state they also class as olive colors, but when calcined are a fine, rich brown. They are good and durable, and also very useful to a sign painter.

TERRA DE SIENNA.—When burned this is a very rich color, much in repute with fresco, sign, and decorative painters. It keeps its color well.

PURPLE BROWN.—This is composed of prussic acid with the oxide of copper. It is a very fine color, and produces with white very fine lilac tints. It is also a good grounding color, and stands well.

ASPHALTUM.—This is a bituminous substance, of a deep, rich brown color; transparent, and a good glazing or shading gold or any other work. It works well with boiled oil or turpentine. It is found on the shores of the Dead Sea and in Judea.

NOTE.—I would here mention the necessity of procuring good, pure linseed oil. This is a very essential point, as many of the oils in the market are adulterated with fish and animal oils, and are, therefore, entirely unfit for use.

DRYERS.

Patent dryers act very well, if pure, but as they are all more or less adulterated with whiting, which imparts a toughness which destroys their fluidity or flowing qualities, I would advise the artist to make his own.

Grind either sugar of lead or sulphate of zinc (white vitriol) in raw linseed oil, or equal quantities of both together. One teaspoonful will dry from twenty to twenty-five pounds of color. This dryer will not injure the most delicate color, even the purest white.

DRYING JAPAN.

This dryer, if of a proper quality and light in color, a teaspoonful will dry from twenty-five to thirty pounds of color.

SMALTS.

Smalts of various colors are required, and I would here state, upon my own experience, that they can be purchased better and cheaper than they can be manufactured. I would advise all painters to purchase at any respectable color store, where their own experience has given them confidence.

A few more necessaries are required, such as a slab and muller of white marble, a pallet knife, pots, paint-brushes, etc., etc. Let the brushes range in No.'s from 2 to 300. Also a few tools, commonly called sash-tools, from No. 4 to 8. Flat French tools, various sizes; a few round tools, bound in tin; also a stock of sable tools, short, medium, and long, to suit all subjects that may occur.

Camel-hair tools and pencils are also good, and generally lay the color finer than sable. A bench is also required; an easel; a set of pallets, of hard wood or ivory; a mall stick (a small slender rod of firm wood, with a ball of cotton at one end covered with chamois skin), to support the right hand. Some artists discard the mall stick altogether, as it hinders a perfect freedom of the pencil, but it is best for beginners, or any one slightly nervous.

A rinsing cup is also necessary; a small tin cup, made to hold about a gill. Have a small cup made to fit into the large one—about one-third as deep—perforated on the bottom with small holes; fill the large cup with turpentine until it reaches over the perforated bottom of the inner cup; rinse the pencils in this, and the refuse color from them will settle to the bottom of the large cup, leaving the turpentine always clear. They should afterward be washed in soap and water.

Having advanced thus far, lay in a small stock of oil, turpentine, japan, etc., etc., a small keg of the best English white lead ("B. B." brand) and then select a suitable board for a sign, and commence

FIRST OPERATIONS.

There are various theories respecting the quality of wood to be used, as also in relation to the particular "cut" of the log. Some contend that the center cut is less liable to warp and "shake," owing to the grain running squarely through. It must be acknowledged that this theory has philosophy in it, and, from my own experience, I admit that it is a good board. But the outside of a log is best, for two reasons, viz.:

In the first place, the outside cut has been more exposed and consequently more thoroughly seasoned. Second, the grain runs through more upon an angle, and, therefore, not so liable to split, shake, or warp.

You must provide yourself with a can of shellac varnish, which is simply shellac dissolved in alcohol, and reduced to a proper consistency to spread easy. The use it is most often put to is covering knots and sappy places that may show after the first coat of grounding.

Another and a better way to use it is, to give the whole board a flowing coat of it, thus making the whole surface equal, and kills any resinous spots, discolorations, etc. The best way to serve knots, however, is to bore them out entirely with a center-bit, boring a trifle outside of the knot, and an eighth of an inch or so in depth. This being stopped with stiff putty, effectually disposes of all trouble arising from knots.

It is a good idea to have a little "stout" shellac on purpose for small knots, as before-mentioned, for in many instances it will completely obliterate them. Make your own shellac, if possible, as it can be more relied upon than the most that is in the market, being generally adulterated with soft gum. It not unfrequently occurs that the turpentine and oil mixes with such shellac, after dissolving it (provided it is not good), but if you make it of shellac alone you may depend upon its quality.

When your shellac is dry mix up as much white lead as you require, beating it up in oil, stiff; then add your dryers, in about the same proportions as already given; then add a little turpentine, just enough to reduce it to the proper thickness; then give your sign-board a good, even, full coat.

When this is dry rub it down with pumice-stone, so that the surface will be perfectly even and free from all plane-marks. Avoid sand-paper, for it never cuts down a surface so well as pumice-stone, although it will do for ordinary work. Then putty up all holes, etc., with good, stiff putty (common putty and white lead mixed, is good).

The second coat may be similar to the first, only let there be less oil in it. The third coat must contain still less oil; say one-third oil and two-thirds turpentine. The fourth, or last coat, must contain very little oil; dry with drying japan.

I have found by years of experience and observation that too much oil is the cause of the blistering and scaling so frequently seen upon sign-boards. The fact is very patent, for, as in coach painting, the more oil used the more contraction and expansion; and, consequently, no other method of mixture will stand all exposures, summer, winter, sunshine, and rain, so well as the one I have given.

As we now proceed to consider the most suitable colors and tints for the various grounds, etc., it will be necessary to enter into the philosophy of *contrasts* and *harmonies*, *force of color*, so as to be able to select proper colors for the work that is to follow.

Contrast in its first element may be called black and white, and this is confined to light and shadow and the disposition of lines. Though both are necessary in works of color, I will take it for granted that you understand them already, and so pass at once to contrast of colors which give the principal charm to painting.

As the present object is to avoid dullness we shall strive to obtain the opposite—brightness, and err, if at all, on the credit side, leaving mellowness of tone to follow as a natural result of an educated eye.

Force or power does not consist in strong and gay colors, but is entirely the result of proper combinations and contrasts. Two contrasting tones must be brought together and then the power of each will be felt.

Thus, if our grounds are warm and yellow tints, we should have blues and purples in contrast.

If our grounds are cool, then reds and yellows are a fine contrast. The three principal contrasts are *blue* opposite

to *orange*, *red* to *green*, *yellow* to *purple*, and by carrying out this principle of opposition of color throughout the scale, you will obtain an endless variety of contrasts.

Remember this, a color and its opposite naturally increase as they approach, but when once they mingle, they destroy and neutralize each other. To give a shadow to a letter, the student must be cautioned not to use merely a darker shade of color, either of the letter or of the ground, for that would only result in a tame, dull effect. Many carry this principle into sign painting, and thus lose the advantage of contrast that an opposite color would give.

The shadow is to represent a certain modification of atmospheric effect, and will, in almost every instance, partake of a natural tone or harmony of contrast.

For instance, let a small block of wood be placed upon a sign; paint the block the color you want for your letters place it so as to throw a shadow either to the right or the left, from the sun, and observe the particular tint of the shadow so cast. You will observe a *compound* effect or tone, proceeding both from the block and from the sign, a natural blending of the two. This gives you a true contrast always in harmony.

Contrasts in great variety can also be had upon the principle of force of color, but there must be a distance left between the letter and the shadow, to relieve it, otherwise the strong contrasts would appear harsh and hard. Always bear in mind that a sign is not like a picture, to be examined at short distances, but generally from fourteen to forty and fifty feet from the eye; consequently the colors used must possess sufficient force (although in harmony) to have effect at such a distance.

The same idea is the point to be gained in scenic representations and a study of effect and force of color, as seen in stage scenery, is a good one for either student or professor.

As a general thing you will find that the reds require a shadow of a purplish or dull brown; in some cases, where the ground admits of it, almost positive black.

And in yellows, of the umber shade, you will require a gradation of golden hues for your first shade, ranging down to nearly black.

RULES FOR CONTRASTS.

Positive and sweet contrasts, such as the following, may be taken as a general idea:

Light pink upon a white ground can be best shadowed by a warm brown.

Light grays and drab grays shadow with rich browns.

For greens, reddish brown shadow.

White to flesh-color, rich purple shadows.

As a standard rule, warm shadows to cool, light colors; and cool shadows to colors of a warm tint.

Avoid the use of greenish blues and greenish yellows; they both appear unsatisfactory and sickly.

Blue and yellow both become agreeable as they incline to red. Red becomes rich as it inclines to blue, and brilliant as it inclines to yellow.

A shade of purple and orange are agreeable, but no greens except those that incline to yellow.

All tertiary tints, such as citron, olive, russet, etc., are agreeable, and have value by contrast of their own shades.

HARMONY.

It may be as well, before leaving the subject of contrasts, to point out how far harmony affects the sign painter, although its principal use has reference to the finished work.

Harmony is the art of uniting two extremes of light and shadow, or of warm and cool colors, by the introduction of such intermediate tones as will subdue the crudeness of effect, caused by the use of opposites alone. By introducing *half tints* which partially unite the dark masses of color, when placed between them, their relation to each other becomes toned down, and in a measure deprived of this rudeness.

Thus the primary colors, red, yellow, and blue, are opposed or in contrast to the secondaries, green, purple, and orange, when standing together, but become united and harmonized by the friendly introduction of a neutral, placed between them.

This is the case with the compound tints, however far

removed from the primary colors, the qualities of color being always brought out by harmonious opposition.

Harmony, then, consists in using such materials between these colors or tones that are opposed as may diminish the violence of the contrast, and conceal the aim of the painter in bringing them together. If this is not done, the attempt and not the deed will confound not only the painter but the reader of his sign.

Harmony, then, is simply that expedient which the force of contrasts compels us to adopt, and is useful to this extent—that by it we secure that force without which our work would be either too tame or too harsh. It is really the golden link in composition.

In describing the mixtures of colors and tints, all that is necessary is to exercise due caution in applying them to your lead or zinc that you have beat up in oil, being careful not to mix too thin, for by so doing you will find it a difficult matter to bring your color to a true assimilation.

As some colors are light and others heavy, you will see the necessity of keeping your color stiff; and always thin your tinting-colors; and always put in the color which is to predominate, or give the general tone, first, and until you see that you have enough, then add the others, if any, to the mixture until you have obtained the required shade.

TABLE OF TINTS.

GRAY.—White and lamp black.
BUFF.—White, red, yellow, and a little black.
PEARL.—White, ultramarine blue, and carmine.
ORANGE.—Yellow and red.
VIOLET.—White, ultramarine blue, and carmine.
PURPLE.—Same as above, only in different quantities.
GOLD.—White, stone ochre, and a little burnt umber.
OLIVE.—White, yellow, black, and red.
CHESTNUT.—Red, black and yellow.
FLESH.—Vermilion, white, and yellow.
FAWN.—White, red, yellow, burnt umber.
DRAB.—White, yellow, red, burnt and raw umber.
Do. —Ochre, burnt sienna, black.
Do. —Any variety can be obtained by these colors.

Brown Green.—Chrome green, yellow, black, and red.

Pea Green.—Chrome green with white lead.

Rose Tint.—Carmine and white, or madder lake and white.

Copper.—Red, chrome, yellow, and black.

Lemon.—Pale chrome and white.

Claret.—Vermilion and blue.

Dove Color.—White, vermilion, blue, yellow.

Pinks.—White, vermilion, madder lake or carmine.

Cream.—White and pale yellow ochre.

Salmon.—White, light red, and yellow.

Straw.—Chrome or yellow ochre and white.

Lilac.—Carmine, blue, and white.

These constitute the principal tints in general use, but by practice in composition, a great variety more can be obtained.

Having proceeded thus far let us now turn our attention to

LETTERS,

their proportion, etc., and take as an alphabet the most beautiful one the world ever knew—the Roman.

The Roman Italics differ from the capitals only by being slightly inclined from a perpendicular, and this inclination should not vary much from an angle of sixty degrees, although natural taste has much to do with governing it.

The letter A is generally formed with more faults than any other in the alphabet, and in nine cases out of ten it is occasioned by spreading its angles too much. It should not be wider than H or N, hair lines included.

The upper part of B, E, F, and R should take up a particle less space on the main line of each letter than the lower part, and the upper, horizontal projecting curve of B and R should in the same proportion be a trifle the smallest.

The connecting bar of the letter H should be a trifle above the center of the letter.

The perpendicular width of the curve for P should take up just half the length of the main limb of that letter.

The bottom curve of J is allowed a handsome sweep, so

that the projecting horizontal line at its top and its curve will occupy the same space as C or S.

The upper curve of S should be smaller than the lower curve, and for this reason—the bottom of all letters should as near as possible form the base of their apparent structure.

The middle top line of W is dispensed with, and that center limb terminates in a peak or point.

To form a curve to the last of R is preferable to a flat. straight termination, provided the curve be made full, and the letter seems to stand firm.

The last limb of G should terminate at seven-sixteenths of its hight, or a little less than half its hight.

Eight letters, B, D, E, G, O, P, Q, and T, will occupy the same space from left to right as they do in hight.

Six letters, C, F, J, L, S, and Z, will take one-sixteenth less width than hight.

M and W, one-sixteenth more width than hight.

I, one-half its hight wide.

If two lines are drawn upon a sign or sheet of paper, say half an inch apart, and eight compartments set off, half an inch square, B, D, E, G, O, P, Q, and T, each will fill one square and be well-proportioned letters.

Then divide off six compartments, one-sixteenth part narrower than they are high, for C, F, J, L, S, and Z.

Then make nine compartments, one-sixteenth wider than they are high, for A, H, K, N, R, U, V, X, and Y.

For M and W, allow one-sixteenth more width than hight; for I, one-half its hight; for &, one-eighth more width than hight.

These proportions will form a very graceful letter, but they can be either compressed or extended from this rule so as to suit both taste and space.

The small letters are more difficult to form than the large ones. The main body of thirteen letters, viz., a, b, d, g, h, r, n, p, q, u, v, x, and y, will occupy a square each.

The letters c, e, o, r, s, t, and y, require one-sixteenth less width than hight; i and l, one half their hight in width.

These relative proportions are given without the projecting limbs above and below their main body, which pro-

jections should be one-half the hight of the main body of the letter.

The proportions for *Italics* are as follows:

Seven capitals, C, G, J, E, O, Q, and S, occupy a square.

Sixteen letters, A, B, D, E, F, H, X, N, P, R, T, U, V, Y, Z, require one-sixteenth more width than hight; M, three-sixteenths wider than high; W, two-sixteenths wider than high; and I, one-sixteenth less; with a given angle of from sixty to sixty-three degrees.

In the small alphabet, seven letters, viz., a, i, k, r, s, t, v, will occupy a square each, subject to the same rule regarding their projecting parts as given for the others, the small Roman letters.

Thirteen letters, b, d, f, g, h, j, n, p, q, u, x, y, z, will occupy one-quarter more width than hight; m, two-fifths more width than hight.

It may be observed here that the block-letter alphabet is of about the same proportion of hight and width as the Roman capitals do, except in extra full lettering, for which proportions the additional thickness of the body of the letter must be added to the rules given in relation to the Roman.

All these letters are only varieties of those given above, and are left to the taste of the painter. Practice, with the rules already given, will unfold much that cannot be written, and much that can only be attained by experience.

Practice what has thus far been given, and then we will go one degree higher, to the consideration of

GILDING.

Before considering this branch of the sign-painter's art it will be best to treat upon the various sizes in general use among them. And here I wish to guard the uninitiated against the use of gold size, sold at most of the color stores. They are generally got up from recipes published by men who are totally ignorant of the nature and properties of a permanent gilding size. My own experience amply confirms this assertion.

Let every painter make his own size, and then he will be less likely to be a stranger to what he wants. If it be too

slow in drying, or if it dries too quickly, he will be able to know what is required to make it right.

An excellent size is made by putting boiled oil in a good stone pot; place it upon a slow fire, and let it rise to such a heat as nearly to ignite; then with a match or a bit of lighted paper set fire to it, and let it burn for a few minutes, so as to thicken; then take a piece of cloth and cover the pot, to put out the flame, and it will then be like syrup or thin tar.

This done, strain it through a silk stocking or handkerchief into a bottle and keep it closely corked. When you wish to use it, thin it with turpentine, but be careful and not use it too thin.

ANOTHER RECIPE.

Another good size for gilding may be made in this way: Procure some pure old drying oil, the older the better; grind into it some ochre and a little of the best quality of red lead; then thin it to a proper consistency; form your letters carefully, laying it very even and thin, and let your work stand until so dry as only to have sufficient "tack" to hold your leaf. Apply the leaf with a gilder's tip carefully and lay it smooth with a flat camel-hair brush or a ball of fine cotton wool, but do not brush off all the superfluous gold until you are sure that the under size is perfectly dry and hard. This gives the gold its full brilliancy and stands the weather well.

QUICK DRYING SIZE.

Take a little good, quick-drying copal varnish; add to it a small quantity of your old boiled drying oil, just enough to give it "tack," and when dry enough lay your leaf as before directed.

A SIZE KNOWN TO BUT FEW.

Take one pound of good, pure drying oil; put it in a metal pot with a cover; slowly add to this, after it has come almost to a boiling point, four ounces of pure gum animi (not copal; gum dealers are of the opinion generally

that animi and copal are one and the same, but such is not the case). Have your animi reduced to a fine powder; take it upon the point of your pallet-knife and put it in cautiously, little by little, until you have it all in, allowing time to dissolve, and all the while keep stirring the mixture. Boil to the consistency of tar, and while warm strain it through a piece of silk into a heated, wide-mouthed bottle; keep well corked, and when required, thin with turpentine and mix thoroughly. If you grind a little vermilion with this size it will show you what you are doing when using it.

This size will gild on glass, china, metal, signs, and nearly everything, and if properly made has no equal; being more durable, it gives more luster to the gold than any other size, and has the very singular property of retaining the "tack" longer than any size known.

This is the "secret size," used by the best artists in London and Paris, and the one used by the justly celebrated japanners of Birmingham, who produce the finest work in decoration to be found in the world's market.

The artist must be furnished with a gilder's cushion, with parchment back and ends; a knife to cut his gold; a "tip," or brush, to lift his leaf with; a ball of cotton wool, and a flat camel-hair brush to clean off with.

Take a little clean tallow on the back of the left hand, and then draw the "tip" quietly over the tallow and it will receive enough to take up the gold. Then place it lightly upon the work, to which it will adhere readily, and so continue until all your sized work has been covered with it.

The next thing to do is to pad it down lightly with your cotton ball, being careful to omit no portion of it, for if a mistake occurs on the first going over, you will find it very difficult to mend it afterward. So be particular in your work and miss no part of it. As before stated, do not thoroughly brush off your work until entirely dry.

Always, when gilding, try your size upon a piece of painted board or glass, in order to determine accurately the length of time it requires to dry. If it dries too quick, add some oil. If you size to-day and gild to-morrow, and should you find the size too dry in the morning, you will have to add a little old, fat, raw linseed oil, as this tempers

it so that you can set your own time for the gilding. A few experiments in this connection will enable you to master and regulate the nature and operation of size

FOR A SIZE EXPOSED TO THE WEATHER.

One thing has been proved by experience, that is, that no gilding exposed to the extremes of summer and winter, wet and dry, cloud and sunshine, *should ever be varnished.*

The bare gold, if good, and on good size, will stand better, change less, retain its luster longer, with less liability to "dulce," or crack, than when varnished, although done with the best copal varnish ever made.

I have seen a sign done with gold, upon a black ground, that had stood the weather *forty years!* The board had given way to the effects of the weather, and had fallen away in many places, leaving the letters standing out bold in good form and well preserved. So much for good size and *no* varnish.

DRYING OILS.

It may not be out of place to give, at this point, a few formulas for preparing drying oils, as many of the oils sold at the stores are of a spurious character, totally unfit for the development of good work.

A fine, pale drying oil can be made as follows: Take eight pounds of linseed oil, one ounce of calcined white lead, one ounce of yellow acetate of lead (also calcined slightly), one ounce of sulphate of zinc (white vitriol), twelve ounces of vitrious oxide of lead (litharge), and one head of garlic. When the dry substances are pulverized mix them with the garlic and oil over a fire hot enough to keep the garlic and oil in a state of ebullition; continue the process until the oil ceases to throw off scum, and until it assumes a reddish color and the head of garlic becomes brown.

A pellicle will then be formed upon the surface of the mixture, which indicates that the operation is completed.

Take the vessel from the fire, and the pellicle being precipitated by rest, will carry with it all the parts which rendered the oil fat. When the oil has become clear, separate

it from the deposit and place in wide-mouthed bottles, where it will completely clarify itself in a short time and improve in quality.

The oil will be lighter in color if the dryers are put into a bag and suspended by a cord fastened to a stick laid across the mouth of the bottle; but you must use more dryers if you wish to adopt this method; in other respects operate as described.

To manufacture drying oil without heat: When linseed oil is carefully agitated with white vinegar of lead (tribasic acetate of lead) and the mixture allowed to clear by settling, a copious, white, cloudy precipitate forms containing oxide of lead, while the oil is converted into a drying oil of a pale straw color, which makes an excellent strong drying oil or varnish, which ought to dry in about twenty-four hours. It contains from four to five per cent. of oxide of lead in solution.

THE BEST PROCESS.

The following proportions appear to be the most advantageous for a preparation of drying oil:

In a bottle containing four and a half pints of rain water put eighteen ounces of neutral acetate of lead, and when the solution is complete put in eighteen ounces of litharge, in a very fine powder. The whole is then allowed to stand in a moderately warm place, frequently agitating it to assist the solution. This preparation may be considered complete when no more small scales of the litharge are apparent.

The deposit of a shining white color (sex basic acetate of lead) may be separated by filtration. This conversion of a neutral acetate of lead into vinegar of lead, by means of litharge and water is effected in about a quarter of an hour, if the mixture be heated to ebullition. When heat is not applied the process will take from three to four days. The solution of vinegar of lead thus formed is sufficient for the preparation of twenty-two pounds or three gallons of drying oil.

For this purpose the solution is diluted with an equal amount of rain water, and to it is gradually added, with casual agitation, twenty-two pounds of oil, with which eighteen ounces of litharge have been previously mixed.

When the points of contact between the lead solution and the oil have been frequently renewed by agitation of the mixture (three or four times per day), and the mixture is allowed to settle in a warm place, a limpid, straw-colored oil rises to the surface, leaving a copious white deposit.

The watery solution, rendered clear by filtration, contains intact all the acetate of lead originally employed, and which may be used in the next operation, after the addition to it as before, of eighteen ounces of litharge. By filtration through paper or cotton, the oil may be obtained as limpid as water, and it can also be bleached by exposure in the sun.

If this oil requires to be absolutely free from lead, it may be so rendered by the addition of dilute sulphuric acid to the above, when, on being allowed to stand, a deposit of sulphate of lead will take place, and the clear oil may be obtained, free from all traces of lead.

ZINC DRYER.

This dryer is prepared from the oxide of manganese and raw linseed oil.

The manganese is broken into pieces as small as peas, dried, and the powder separated by a sieve. The fragments are then placed in a bag made of iron wire gauze—this to hang in the oil contained in the iron or copper vessel—and the whole heated gently for twenty-four or thirty-six hours.

The oil, however, must not be allowed to boil, for there is great danger of its running over. When the oil has acquired a reddish color it is to be poured into an appropriate vessel to clear.

For one hundred parts of oil, ten parts of manganese may be employed, and which will serve for several operations when freshly broken and the dust separated.

Experience has shown that when fresh oxide of manganese is employed, it is better to introduce it into the oil on the second day. The process occupies a longer time with the fresh oxide. Very great care is required to prevent accident, and one of the principal points to be observed is that the oil be not overheated. If the boiling should render the

oil too thick, this may be remedied by an addition of turpentine, after it has thoroughly cooled.

COLD-MADE DRYING OIL FOR ORDINARY PURPOSES.

Four ounces of litharge to the gallon. Stir it often, and allow it to settle. Pour off carefully, and you have a good, clear, drying oil.

Any of the drying oils described will work and stand well, if you use sufficient turpentine in the mixing, and you will thereby be able to dispense with raw oil and japan dryers. If you wish to hurry up your work a little drying japan can be used.

GILDING ON GLASS.

This beautiful art is worked in many different ways, every artist having his own peculiar method.

One very good way is to first outline with a piece of hard soap, your letters, scrolls, etc., (on the outside) then commence to outline on the glass (inside) with some suitable color, a light shade line for the top and left side of the letter; then upon the bottom and right side of them use a black, or, in fact, almost any color you may select. When dry proceed to lay on your gold.

Some use gin, some whisky, others simply water; gum arabic in solution, white of egg, may be used. One can merely breathe upon the glass and it will sometimes answer the purpose of a "tack" for the gold.

I have found an excellent size, made from a solution of gum tragacanth in water. The first part that dissolves is the part that suits best; that portion being pure, while the residue is cloudy and unfit for use.

When wanted to use, reduce a portion of the gum with water to a very weak standard, as in all cases you will find your gilding bright in exact ratio to the thinness and transparency of your size. I consider this the most desirable size, especially for large work.

OUTLINING UPON GLASS.

First Method.—Draw your lines upon the glass at the proper distances for the size of your letters, etc., with a piece of hard soap, which will make very distinct lines. Then form your letters accurately, and in true distances or space, one from the other, being satisfied that all your proportions, etc., are correct. You will now be ready to commence your gilding.

Second Method.—Have your letters, etc., drawn out on fine paper; prick with a pin the outlines of your letters, scrolls, etc. Next take a bag made of muslin, filled with fine powdered charcoal; lay the paper carefully to its proper place; then pounce the charcoal bag against the paper, and you can then trace the outlines in full with black japan. To make all secure it will be necessary to give the work two or three coats, and when dry, wash or rub off all superfluities with a sponge or soft cotton rag.

N. B.—This method is only used after gilding, where the leaf is placed full without any outline.

Third Method.—To get accurate lines upon glass, preparatory to gilding. In the first place, clean the glass thoroughly; then with a mixture of whiting, water, and a little milk, brush carefully all over the outside of the glass. When dry, draw your parallel lines, letters, scrolls, etc., with a pointed stick.

For small work, turn the glass around, and letter backward. If inside of a window, work upon the same principle. This is an easy and a true method of forming your lettering or ornamentation, as any fault in the drawing can be easily corrected.

MODUS OPERANDI FOR GILDING ON GLASS.

Whichever size you agree upon, lay it on with a full pencil, and proceed with your gold at once, so as to secure a solid "cover" without being obliged to "touch up," and if you wish to use two coats of gold, blow your breath upon the first coat to hold the second.

Lay as much gold as possible before your size dries, and so proceed until your lines are finished. Then rub it down

gently to remove the superfluous gold. Then proceed to outline as in second method above; or draw your parallel lines through the gilding (if in capitals of one given length) and cut in your letters with black japan very carefully, forming them all backward. This is the principle of the first method, but it requires considerable practice to do it correctly.

If any ornament is wanted in the body of the letters, lay them in with oil size. When dry, gild and shade if required. When all is dry, lay in the entire letter with the size (spirit or water size) and gild and back, as above, viz.: with two or three coats of black japan.

The shading is done afterward, and in any colors the artist may decide upon. It generally takes two coats to cover solid upon glass.

Gilding upon glass requires great practice and very nice handling, but with proper care, this process looks very beautiful and stands well.

Silver leaf is laid on in the same manner, only it requires a little stronger size than the gold calls for. The silver being heavier relatively, use the size of gum tragacanth.

One point seems rather difficult—that of having to form the letters backward, but practice is the only thing that will make perfect in this respect, and enough of it will make, what at first seems a difficulty, as easy as the formation of letters in the ordinary way.

CHANGEABLE SIGNS.

Have a board made of any convenient size, and have a projecting band or molding around it. Then cut into the band grooves the thickness of a handsaw, an inch apart, allowing each cut to reach to the bottom of the band. In each of these slots insert strips of tin, just wide enough to fill the entire slot, and long enough to reach entirely across the sign board.

When all fitted, take them out and place them edge to edge upon a flat surface, and paint any word you like upon their combined surface. When dry, reverse and paint other words upon the other side.

Next paint any words you please upon the surface of the

sign board, and, when dry, again insert the strips of tin into the slots in the board, taking them up in the same order in which they lay when painted upon.

This is really a magical sign (three signs, in fact), and changes as the observer changes his position, at one angle showing one thing, and at another quite a different one. They are coming much in use now-a-days, and it is a good branch of the art to make one's self perfect in.

JAPANNED TIN SIGNS.

Draw your letters on paper to suit your sheet of tin, having first cleaned it with diluted alcohol and a piece of cotton. This will remove any grease or other matter that might hold the gold. Then take some whiting and rub it over the back of the paper upon which your design is made and lay it upon the japanned tin.

Place a weight upon the four corners of the paper, or otherwise fix it securely to the tin; then, with a fine pointed piece of hard wood, trace the design carefully, bearing upon the paper with the point just hard enough to cause the whiting on the under side of the paper to adhere to the tin, and after going carefully over the whole, you will have transferred the entire design in fine white outline to the tin you are to finish it upon.

Then size with either quick or slow drying oil size, and, when sufficiently dry for gilding, lay on the gold leaf, and "bat" it down thoroughly, afterward brushing off with your flat camel-hair brush or cotton.

REMARKS ON SHADING.

There is a difference between shading and shadows. Shading a letter is simply making an artificial representation of a raised letter, and consequently requires a light fine shade upon the top and left side of the letter, and a dark one upon the bottom and right side.

These shades will have the effect of raising the letter, but the deception is incomplete without the shadow. This is to be attained by representing a shadow cast by the painted object, and should always be of one uniform color: dark, but very thin. A mere glaze, as it were, composed

of ivory black, Vandyke brown, raw and burnt umber, asphaltum, etc.

Always keep in view the tone of the ground, for that has all to do with choosing the most natural shadow, as stated before. The above enumerated colors, by judicious and well balanced composition, will yield an excellent shadow to suit any ground.

In shading letters, considerable judgment is necessary, as some of the alphabet requires less shade than others, for this reason: a portion of them would be filled up too much if the shade was of uniform weight. B, S, K, G, and N, the body angles of which do not admit of so heavy a shade as perpendicular or bottom letters.

It is very general with sign painters to make the bottom shades a trifle heavier than the perpendiculars, and for this reason: the sun casts a heavier shade to the bottom in proportion to the angle of light, and for this reason a heavier shade is demanded.

In regard to the formation of letters, one rule will hold good in all respects, at least so far as Roman letters are concerned; in case you do not wish to paint them square—as wide as they are high—diminish the width in exact ratio to the increase of the hight, and *vice versa*.

PAINTING ON CLOTH OR SILK.

For Masonic or Oddfellow's aprons, banners, or any work of like nature, a few words may be useful.

First have your material put upon a stretcher, and then complete your lettering and design. Prepare a size as follows: Dissolve bleached shellac in alcohol, and thin as much as will cover the parts to be painted or gilded, using the precaution to cut over the outline a little, so as to prevent the color from spreading.

Another size may be prepared by simply using the white of an egg. This size will do where the work is not exposed to the weather, or when it is required to be done quickly; and for such work, where gilding is to be done, lay the gold while the size is wet, and when dry, dust off the surplus gold and proceed with the painting, shading, etc., when you are sure that the size is dry, remember.

SIZE FOR BRONZING.

A good size for bronzing, or pale gilding, is a mixture of asphaltum, drying oil, and spirits of turpentine.

A size for gilding on cloth, silk, plaster, etc., is made as follows: Take a little honey, combined with thick glue. When reduced properly, this size has the effect of brightening the color of the gold leaf, sticking to it well and giving it a very fine luster.

VARNISHES FOR SIGN WORK

The artist has already been cautioned against the use of varnish for gilt signs; but there can be no doubt that the varnish not only improves, but is actually necessary upon a sign where the decorative or ornamental style is introduced. Varnish has the effect of bringing out the force of colors; brings them to their true tone, and gives the artist an opportunity to be judged on his merits, relative to harmony, contrast, and force.

For this reason, considerable care must be taken in selecting a suitable, durable varnish for this purpose.

An excellent varnish for sign painters may be made as follows: To eight pounds of best African copal, add two gallons of pure, clarified, drying linseed oil, half a pound of sugar of lead (acetate), three and a half gallons of turpentine.

Boil the copal in the oil very slowly, for from four to five hours, until quite stringy; then allow it to cool to about 130 degrees F.; afterward add three and a half gallons of turpentine at the same temperature. Mix well, and strain into cistern or tank. This makes a slow-drying elastic varnish, not liable to crack by any out-door exposure.

QUICK DRYING VARNISH.

"Japanner's gold size," or quick drying varnish, may be made in this manner:

Eight pounds gum animi, half a pound dried sugar of lead, two gallons of clarified drying oil, three and a half gallons of turpentine.

Boil for four hours, strain, etc., as above.

Use one pot of this varnish to two of the former kind, the slow drying. This mixture will dry in about four hours in summer and six in winter.

This quick drying varnish makes a good dryer for delicate colors ; about a dessert-spoonful to twenty-five pounds of color being a fair proportion.

Should the artist not wish to manufacture his own varnish, let him avoid buying any cheap article, but inquire for "slow drying body copal varnish," and also for the best drying japan, so that if required to varnish a piece of work that is wanted to dry quick, he can do so by adding a little of the japan.

MISCELLANEOUS RECEIPTS.

TO CLEAN OLD SIGN BOARDS.—Brush over the face of the board with warm alcohol, and repeat two or three times if necessary, after which the " smalt will come off easily, by the use of a dull chisel or an old plane-iron. Care should be taken not to cut into the surface, as such places are hard to patch up again.

ANOTHER METHOD.—Take three and a half pounds of stone lime, two pounds pearl-ash, two ounces soft soap, three ounces of ammonia. Slack the lime, then add the soft soap. It may require a little water to form a paste ; then add the pearl-ash and the liquor of ammonia. Keep in a close-stopped, wide-mouthed bottle, or stone jar, with a little water, like paint. This mixture, when laid on a sign or any old piece of painting, will soften it so that it will wash off with the utmost ease.

STILL ANOTHER METHOD.—Lay your work top up, and go over it with turpentine ; set fire to it, and the old paint will soften up, and with an old chisel or a piece of flat, sharpened wood you can scrape off the old color with perfect ease. The best way of doing this is to cover a foot or so at a time with the turpentine, and proceed as above. Then rub off with pumice and water.

TO LAY SMALT GROUNDS.

Mix your color as near as possible to the desired shade to suit the smalt; mix with strong drying oil, not too thin; then cut round your letters, scrolls, etc.; with a fitch and sash tool fill in all the spaces; then with smalt dust all the surface, taking care to put more than enough on, so as to allow the "oil ground" to absorb all it possibly can. When dry (usually the next day) turn your signs on end, or on the side, and all the surplus smalt can be brushed off and saved. A small wire sieve is good for straining smalts.

Some printers shade their letters first, that is, before smalting, which is the neatest way for fine or small work; but for large signs it will have a better effect to shade the letters after smalting. Mix the shading color with very little oil, mostly japan and turpentine, and draw with short quill tools or French fitches.

FLOCKS.

Flocks are laid upon the same principle. These grounds are very beautiful and chaste looking, but they are very unsuitable for signs that are exposed to the weather, as the colors do not stand any length of time, black being the only one that can be depended on.

Instead of smalts, colored sands are sometimes used. These retain their colors well, and if taste is displayed in arranging the hue and tints, very beautiful work can be produced.

FACING PUTTY FOR SIGNS.

Facing putty for signs that are to be gilded may be made in this way: Take a little fine whiting, a very little drying oil, japan dryers, and beat all up to a reasonable stiffness. With this mend all the inequalities with a square-ended knife. This putty will harden very rapidly and dries without any shrinkage, tack, or softness. In mixing, use more japan than oil, say two-thirds japan.

GLASS SIGNS, WITH PEARL SETTINGS.

The best method of doing such signs is, first to draw your parallel lines with a sharp pointed piece of hard soap. Then form your letters correctly, giving them the proper distances, etc.

Have your outlining very true, as by so doing you will avoid much trouble when finishing. If you desire to enclose the pearl within gold lines, clean your glass upon the opposite side, then with your camel-hair brush lay on your size as directed for gilding on glass.

When you have done this, lift your gold leaf and lay it on carefully. When all the gilding is done and dry, take a pencil of the proper size and cut in all the letters as neat as possible, giving them sufficient strength and weight in proportion to the size of the letter, leaving the center or blank space entirely clear.

By "cutting in" I mean that all you wish to show in gold must be laid in with black japan, two coats. When the japan is dry, then wash off carefully all the surplus gold. The work is now ready for the pearls.

The pearl for this work is all prepared, ready for use, in thin pieces or sheets. There are two kinds, the *snail*, and the *aurora*, also the small broken pieces, called *scrap*, which is very useful in filling up small portions of the work, and forming different kinds of ornaments.

If careful in selecting the snail pearl, great beauty and order may be obtained, for shells of an equal size and form when cut into sheets will reflect either concave or convex, according to the side presented to the eye.

If a round piece is wanted in the center of each body and round turn of the letter, cut the sheet with a sharp pair of scissors into the desired shape. It is the best way to make a pattern of tin to cut them by, thus insuring a perfect uniformity.

Then clean off the edges with a fine file, and arrange them upon your table so as to have them reflect all one way, convex side up. Have your size in a little cup, a short, stiff, sable pencil, etc., ready to work.

Lay a coat of size over the face of the pearl and then put it in its proper place in the letter. Press it hard upon

the glass so as to displace all the size possible, as much of the beauty of the work depends upon having as little as may be of the size show between the pearl and the glass. As with glue and wood, the less glue there is in a joint the better it holds, and the closer the pieces of wood approach each other.

When you have set all of the pearls turn the glass face upward, and see if all are placed so as to show alike, for if there are any corrections to be made now is the time to make them.

There are a great variety of forms manufactured and for sale, such as representations of humming-birds, paroquets, fish flowers, scrolls, etc., which are susceptible of being made into very pretty work when judiciously handled. In short a thousand varieties of work can be produced and many different materials used in this same way.

After the larger pearls are set you can form the other portions of your letters with such sizes as you may choose, and fill up the smaller portions with the "scrap," taking care, however, not to have the pieces set too near together, or the effect will be bad, as much relief is obtained through the medium of the ground.

When your size is dry and the pearl firm, then have your ground mixed up stiff with drying japan, oil, and turpentine, but only a small proportion of oil. After mixing it to the proper shade lay on a heavy coat of ground color.

When any particular style of ornamentation is desired you can vary the colors of your ground, shading the different sides of the letters, scrolls, etc., to suit your own taste and fancy, doing the shading in a similar way as you would any glass signs.

Green, red, yellow, white, etc., are used with good effect, shaded in order, viz.: greens with darker greens; reds with brown, purple, etc.; yellow with burnt umber, blending carefully. In short, a great variety of colors may be used in such work, and, as before said, an endless variety of styles produced.

SIZE TO FIX THE PEARL.

1st. Pure mastic varnish.

2d. Pale, quick drying copal varnish.

3d. Copal varnish and Canada balsam : one-third copal; two-thirds Canada balsam.

In shading letters, they look best when the shade is drawn on an angle of about forty degrees, although much depends upon the taste of the artist.

With the simple rules here given for pearl and fancy signs, every variety known in the market may be produced.

CONCLUDING REMARKS.

Having gone over about all that is necessary to constitute a ready "Hand Book" to the sign painter, a few concluding remarks may not be inappropriate. I do not presume to teach the practical sign painter or gilder, still I flatter myself that even he may find in this Manual many things that are new or but imperfectly understood.

These recipes and methods—in fact, the contents of the entire book—is but the summary of a long experience on my part, both in this country and in England. I have given nothing and advanced nothing but what I have used and profited by myself.

Still experience is not the only help a man may employ. The experience of others oftentimes saves us from much labor in personal research and experiment, and what I have read, what I have learned myself during forty years of practical sign and decorative painting, is here given freely for the good of the profession.

SCALE OF PRICES.

Letters are generally charged for by the foot.

Plain letters - - - - -	30c.	per foot.
For one shade, add - -	10c.	"
Double shade, add - - -	20c.	"
Gold letters - - - - -	$1.00	"

Ornamented letters, scrolls, etc., charge for time and ma terial in the same proportion.

Japanned tin signs - - -	7c.	per inch.
Shading " - - -	2c.	"
Lettering on glass - - - -	7c.	"
Letters made on glass, tin, or stone	3c.	"
Plain ornaments, same as letters.		
Gold borders - - - - -	3c.	"

In gold or plain surfaces, the labor equal to cost of the gold.

Ornaments in proportion to the labor.

These rules will serve as an average in proportioning the prices to the amount of labor.

It would be superfluous to enumerate a further list of prices, for the purpose of meeting every variety of lettering and ornamenting, but these prices given may be taken as a standard, subject always to the fluctuations of the prices of labor and material.

FRESCO PAINTING,

AND ITS AUXILIARIES COMBINED.

Of all those attainments which contribute as well to the gratification of the senses as to the refinement of the taste and the enlargement of the intellectual powers, the art of Painting is perhaps the best adapted to the human mind.

The satisfaction derivable from the contemplation of a beautiful work of art possesses a peculiar advantage; it is renewable at pleasure without any continuance of the exertion by which it was produced. But a rare combination of talent with industry, or, at least, great industry, can alone lead to productions which may claim admiration beyond the circle of our own partial relatives and friends. Experience has proved the impracticability of conveying a knowledge of the elementary principles of this art, in any manner so as to supersede the useful labors of the drawing

master or teacher, yet there is much to be learned before the pupil can go alone, with confidence, after the period when his attention ceases, and which the limited duration of his lessons cannot include; to this we must attribute the fact that so many who make a fair progress under the master's eye, either never attempt any performance with the pencil after he has ceased to superintend and direct their studies, or finding themselves embarrassed at the outset, abandon the pursuit and fancy "their genius does not lie that way." We will presume, however, that the reader has gone through the usual elementary course of instruction, that he is able to copy with accuracy the outline at least of any object which may be set before him; this and much more may be obtained by any person of moderate abilities by industry, without an iota of that much misunderstood quality genius, which has proved an ignis fatuus to thousands. One of the greatest artists of the day was right when he said: "Nothing is denied to well directed industry; nothing is to be obtained without it." Depend, then, wholly upon your own exertions, and listen rather to the criticisms of the judicious than the praises of those who will flatter you with assurances that you pcssess intuitive excellences which may render application unnecessary. To recommend a proper course of study will be the most useful purpose to which these pages can be devoted, for it cannot be dispensed with.

Before any attempt be made beyond copying, the student is enjoined to acquire a clear view of the leading principles of perspective on pain of committing absurdities, for which no beauty of color can atone; it will be found less difficult than is generally imagined. Although it would be impossible to compress into our limits all the explanations and diagrams necessary to an illustration of its theory, we shall subsequently offer a few observations which, we trust, will prove beneficial to the student.

There are two points to which we would particularly wish to call attention, because they are errors that greatly retard the progress; one is a want of command of hand, the other, an impatience to produce a finished effect without the systematic and gradual process necessary to the production of a piece of good work.

To remedy the first will require great attention and practice, if the uncertainty of hand or timidity of touch exist in a great degree. It is never found among the artists of necessity, with whom quality of production is an object of importance, as decorative painters, designers for furniture and manufacturers; with these freedom and precision of hand are seldom wanting.

We advise the pupil to study well every line before it is begun, to determine its exact course and bearing; in short, to look from the object to be represented to the surface on which it is to be drawn again and again, until the mind's eye transfer it and the imagination sees it in the place it is to occupy—that is the moment to be seized, and then the quicker the line is drawn the better. Large objects should be copied on common sheets of paper; it is a great check to the freedom of the hand to have your sheets too small, as it has the tendency to produce fear about spoiling your design or drawing. Still avoid the opposite extreme, and remember always that true proportion and correctness is the first principle of the art.

An occasional hour or two would not be misspent if occupied in drawing straight lines perpendicularly, diagonals, parallel to each other, and circles without the compasses.

This observation is applicable to many who would be ashamed of being seen so employed; who have, in fact, attempted to execute a piece of work without sufficient practice in the rudiments of the art.

The second error is even still more common, that is for a painter to proceed to color, or rather to waste his time in shadowing or coloring upon an outline which might mean anything. There is no time in the progress of a piece of work, when the forms of objects can be so conveniently improved, as when they are in a faint outline; a thorough conviction of this, and experience of the pleasure of modeling as it were into substance by shadows, and adding the charms of color to well-studied forms will render patient labor less irksome by anticipation of certain ultimate success.

In your early practice of drawing from solid objects, it would be well to make several studies from a white globe,

placing it in different lights, and having only one window in the room.

You will find that there is but a single spot upon it which can be represented by perfect whiteness ; and that all the other rays falling obliquely upon a receding surface, a weakened light is received, diminishing, at last, into absolute shadow, until again relieved by reflection from surrounding objects on the opposite side. A cylinder may be made by a roll of paper, an egg will serve as an oval, and a cone may be obtained by rolling up a sheet of paper in the shape of an extinguisher. Thus the models are easily obtained, and the pupil has but to study them well, and he will imbibe all the principles of light, shadow and reflection.

He may then proceed to the plaster bust, which must be clean and free from dust, as discolorations greatly embarrass an inexperienced practitioner.

The outline should be sketched faintly at first with soft charcoal (that made of the willow is the best), the superfluity of which may readily be removed from the paper by a soft feather duster or a light whisk of the handkerchief, or even a feather, leaving a faint but sufficiently distinct representation. This should be repeated until the pupil is satisfied with the form and proportions, when colored chalk may be used.

A gray paper we prefer, as it forms the most natural medium between the black and white chalk, and must always appear between them. Soft French chalk is the best for general purposes, and the Italian chalk, which is harder, for finishing, or where great neatness is required.

Center pieces for ceilings, scrolls, spandrels, parterres, etc., moldings, copies of the various orders of architecture, viz. : Tuscan, Doric, Ionic, Corinthian, and Composite.

Here the pupil will find a large field for study, and we would strongly recommend that those various orders should be copied from some genuine prints, in parts and in whole so as to familiarize the eye and cultivate the mind to all the varieties therein contained.

Those lessons in colored chalks are the most ready methods for gaining knowledge in shading, etc., so as to raise any object upon a plain surface, to represent that relief or effect which is wished to be obtained previous to attempt-

ing anything with water colors. For if not very conversant with the true forms of the subject to be painted, the pupil will find himself launched into a sea of trouble from which it will be difficult for him to extricate himself.

Therefore, I repeat, that owing to the difficulty of working colors in distemper upon a ground of the same kind, where any fault, either in tint or position, is by no means easily rectified, the more does the pupil require extensive and laborious practice in coloring with chalks or crayons. Then he will become decided and sure of touch, and make every line tell with masterly effect.

Speaking of the various orders, their prominent distinctions are as follows: Tuscan, of which the usual hight of the column is seven diameters; Doric, eight; Ionic, nine; Corinthian, ten; and Composite, ten.

The Tuscan is quite plain, without any ornament whatever.

The Doric is distinguished by the channels and projecting intervals in the frieze, called Triglyphs.

The Ionic by the ornaments of its capital, which are spiral and are called volutes.

The Corinthian by the superior hight of its capital, and its being ornamented with leaves, which support very small volutes.

The Composite has also a tall capital with leaves, but is distinguished from the Corinthian by having the large volutes of the Ionic capital.

A complete order is divisable into three grand divisions, which are occasionally executed separately, viz.: The column, including its base and capital; the pedestal, which supports the column; the entablature, or part above and supported by this column.

These are again each subdivided into three parts: The pedestal into base or lower moldings; dado or die, the plain central space; and surbase or upper molding.

The column into base or lower moldings. Shaft or central plain space, and capital or upper moldings.

The entablature into architrave, or part immediately above the column; frieze or central flat space; and cornice or upper projecting moldings.

These parts may again be divided thus: The lower por-

tions, viz.: the base of pedestal, base of column and architrave, divided each into two parts; the first and second into plinth and moldings, the third into face or faces, and upper molding or tenia.

Each central portion, as dado of pedestal, shaft of column and frieze, is undivided.

Each upper portion, as surbase of pedestal, capital of column, cornice of entablature, divides into three parts; the first into bed molds, or the part under the corona; corona, or plain face; and cymatium or upper molding.

The capital into neck or part below the ovolo; ovolo or projecting round molding; and abacus or tile. The flat upper molding mostly nearly square.

These divisions of the capital, however, are less distinct than those of the other parts.

The cornice into bed mold, or part below the corona; corona, or flat projecting face; cymatium, or molding above the corona.

Besides these general divisions, it will be proper to notice a few terms often made use of.

The ornamental molding running round an arch or round doors and windows, is called an architrave.

An ornamental molding for an arch to spring from, is called an impost.

The stone at the top of an arch, which often projects, is called a key-stone.

The small brackets under the corona in the cornices are called mutules or modillions; if they are square or longer in front than in depth they are called mutules, and are used in the Doric order. If they are less in front than their depth, they are called modillions, and in the Corinthian order have carved leaves spread under them.

A truss is a modillion enlarged and placed flat against a wall, often used to support the cornice of doors and windows.

A console is an ornament like a truss, carved on a keystone.

Trusses when used under modillions in the frieze are called cantalivers.

The space under the corona of the cornice is called a soffit; as is also the underside of an arch.

Dentils are ornaments used in the bed molds of cornices; they are parts of a small flat face which is cut perpendicularly, and small intervals left between each.

A flat column is called a pilaster, and those which are used with columns and have a different capital are called antœa.

A small hight of paneling above the cornice is called an attic, and in these panels and sometimes in other parts are introduced small pillars, swelling toward the bottom which are called balusters, and a series of them a balustrade.

If the joints are channeled the work is called rustic, which is often used as a basement for an order.

Columns are sometimes ornamented by channels, which are called flutes. These channels are sometimes partly filled by a lesser round molding; this is called cabling the flutes.

For the better understanding the various orders it will be proper first to notice the different moldings which by different combinations form their parts.

First.—The ovolo or quarter round.

Second.—The cavetto or hollow.

Third.—The torus or round.

From the composition of these are formed divers others, and from the arrangement of these, with plain flat spaces between, are formed cornices and other ornaments. A large space is called a corona if in the cornice; a fascia in the architrave; and the frieze itself is only a flat space. A small flat face is called a fillet or listel, and is interposed between moldings to divide them.

A fillet is in the bases of columns and some other parts joined to a face or to the column itself by a small hollow, then called apophyges.

The torus, when very small, becomes an astragal, which projects, or a bead, which does not project.

Compound moldings are the cyma recta, which has the hollow uppermost and projecting.

The cyma reversa, or ogee, which has the round uppermost and projecting.

The Scotia, which is formed of two hollows, one over the other, and of different centers.

Several beads placed together, or sunk in a flat face are called reedings.

All these moldings, except the fillet, may be occasionally carved, and they are then called enriched moldings.

From these few simple forms, by adding astragals and fillets and combining differently ornamented moldings, faces and soffits, are all the cornices, panels, etc., formed, and the modern compositions in joiners' work, etc., fresco painters, builders, etc., are very numerous, and too well known to need describing.

For human figures or animals, fruit, flowers, etc., the student must supply himself with good specimens, either lithographs or good prints of any kind, and practice from them until he has acquired sufficient knowledge of proportions, form, size, etc., to suit the various positions to which they may be applied; true proportions are of vital importance to the fresco painter, as his drawing will be about the first point of criticism to which he will find himself liable, even more so than to his shading or coloring. For it matters little how well coloring or shading may be executed if the drawing is deficient. Therefore let the pupil persevere in this branch of the art.

In drawing flowers the center should be drawn first, as by spreading outward, the graceful and ever varying forms of nature in every stem and leaf may be more easily expressed.

In the subsequent operation of coloring them they require much more attention than any other part of the work, so as to produce a soft and accurate effect; but not an equal degree of skill and experience to produce a beautiful whole.

In this kind of drawing, as in every other, the first lesson should be obtained by following the draughts of the most skillful masters, comparing their productions at the same time with nature. As flower pieces are inspected with almost microscopic attention the fibers and figure of every leaf must be distinctly expressed. Flowers which do not blow at the same season of the year should never be grouped together.

In drawing fruit great care is to be taking in assorting or arranging them so as to produce the most imposing effect. So place them as regards color, size, etc., with an easy carelessness that they may by such freedom of position aid the pupil in producing a good harmonious painting.

FIGURE PAINTING,

As before stated, requires correct proportions, good coloring, great ease, and a general softness throughout, to be graceful and mellow in tint, avoiding cold or harsh shading, etc., having always in view the fact that this particular branch of the art demands consummate skill and great truthfulness.

OF LIGHT AND SHADE.

When a ceiling or side paneling is drawn out carefully, and the pupil is satisfied that all is in due proportion and correct to the order desired, the next point of consideration will be to judge from what particular side of the room the light falls from and upon the objects drawn, so that all the shadows may fall one way, and of course from the light.

That part of design, panels, scrolls, etc., whose sides are nearest the quarter from which the light comes, must be the brightest, and the remainder must be gradually darkened.

Surfaces which are wished to project being nearer the light than others, must be sharp and well illumined where the enlightened side can be seen. The faintest lines should be put in first, proceeding gradually to the darkest. All shades should be rather too light at first, that they may be worked up gradually to the full effect.

All strong lights must be relieved by deep shades, but it must be remembered that strong reflections diminish and always soften the shades cast by the original light, so as in some instances to make the side of a body which retires from the light brighter than a nearer part.

It is by the reflection of light received from the sky or terrestrial surfaces that the darkest part of cylindrical and globular bodies, is not that which is the most distant from the original light; and from the peculiar nature of the reflection from such surfaces, when the light falls on one side of them, the lightest part is not always that which is nearest the light.

In shading an upright round pillar for example, a small portion of the side nearest the light, supposing the light

to come from one side, should be a little shaded; the next portion should exhibit the strongest light, which in water color will be almost the ground color unless the ground be dark, then it will have to be run in almost pure white.

Then will come the deepest shade, and lastly a shade for the further side somewhat deeper than the one on the side nearest the light. These shades duly softened into each other will give the idea of a round body.

Titian declared that the best lessons he ever received on the distribution of light and shade were derived from studying and drawing bunches of grapes.

Having as briefly as possible laid down the most useful preliminary studies in the art of fresco painting, as far as architecture, light and shade, etc., etc., are concerned, we will now proceed with an outline of the method of preparing ceilings, walls, etc., and also the proper mixtures for laying the grounds, stiles, etc., preparatory to running in the lines to form panels, ornaments and decorations.

If the walls and ceilings are new plaster (that is clean). I would prefer giving them a good coat of paint previous to using the distemper colors, and for the best of reasons, for by so doing you insure against stains or a striking in of your distemper coats, which is very apt to occur if not painted.

The first coat of paint should be mixed about two-thirds turpentine and one-third linseed oil, with as much japan drier as will dry it hard; too much oil would be liable to bear out so as to cause your distemper color to crawl and not lay well, therefore better err upon the other side, viz.: too much turpentine rather than oil.

When thoroughly dry have good glue in readiness, first prepared by steeping it over night in water to soften, then melt in a suitable pot or kettle, and be cautious not to overheat it in melting; in fact it ought never to boil, for boiled glue never works well and soon spoils in mixed color.

Then have good Paris whiting, take as much as you think you will require for the amount of work you intend to first coat, beat it up thick with water, be sure that you have it all reduced to a perfect pulp, no lumps.

Then take a working pail, and put in as much of your

beat-up whiting as will go over your intended piece of work.

Then take the colors required to produce the shade wanted (the colors previously ground in water) and cautiously mix with the hand, which is preferable to a spatula or stick, till you get the shade desired, which you can prove very easily by drying a little on your hand or on a piece of white paper; if too dark, add more whiting, or if too light, more color. When you have got the tint to your mind, take your melted glue and put in enough to bind the color very hard so as not to rise or wash up with your second coat. This you can also test upon a piece of paper before you lay the color upon your plaster, ceilings or walls, for by neglecting to have sufficient size or glue in your color your second coat will mix up with your first, and the two will roll and gather thereby spoiling your work; the result of which will be that you will have to sponge off both coats with water, thus loosing your time and materials, and suffering disappointment and mortification besides, for your neglect.

If all goes well you will find that two coats will be sufficient in the most of cases, and ought to be made a rule as far as possible to manage ceilings with two coats.

Having now got the plane of your ceiling or wall done you now proceed to mix up the color for the stiles or border, and carry out a similar procedure with them until all looks smooth and solid, and if satisfied with the color and its covering qualities you next proceed to mix up all your shades for drawing your moldings as above directed, viz.: run all your light lines first, then the secondaries, deep, etc., relief, etc., until the molding yields a just resemblance to the order required; the corner pieces can now be acted upon, all cut in with the same colors; when the last touches are put in let the edges be cut sharp and crisp, and do not forget the relief shadows to them also. Now examine the whole work carefully so that nothing shall be left undone or forgotten.

CENTER PIECES WITH FLOWERS.

If flowers are to be put in panels, first draw them correctly, then proceed to color them according to nature if so wanted, then lay in a suitable ground around the group up to the molding, let it be a somber neutral color so as to sink the ground and relieve the flowers. If

FLOWERS IN RELIEF,

You work them out in the same colors as was used in the moldings of the ceiling, giving the group a strong relief shade; but do not lay in any other ground but simply the panel color.

Some fresco painters lay such panels in a different color, but I question if that taste adds anything to the general beauty and chasteness of the ceiling; it is too gaudy, too much, to use the vulgar term, "ginger bread style." Yet some parties will have such work, and to please sometimes the artist has to give way; but always suggest, where it is safe to do so, if for no other reason than to put yourself in a proper position before the public on such matters. It is the duty of an artist to state what is the right harmony, etc., whether adopted or not by the employer.

COLOR FOR CEILINGS, WALLS, ETC.

Regarding suitable colors for interior decoration, there is several considerations of importance which must be here noticed.

First, the kind of building and its use, a church, a public hall or dwelling house; also the position of the house in reference to the cardinal points of the compass, north, south, east or west, for the following reasons, viz.:

If a south or west exposure, that portion of the house will have a large share of sunlight, consequently a natural warm glow of heat, while the north and east, although possessed of sufficient light, as a natural result, a certain coolness consequent to the want or absence or nearly so of direct sunlight.

Therefore for south or west expesure it will be seen at a

glance that cool colors must be selected, as a want of this knowledge might cause the most disagreeable feelings to those who had to endure the effects, although they might be altogether ignorant of the cause (by the painter) through neglect, or want of knowing why, this disagreeable feeling was induced.

And vice versa for rooms situated on the north or east side of a house. The colors must be of a warmer shade or tint; thus, during the warm season the effects of color upon the mind is such as to produce an equilibrium.

So that any person passing through a house at any season of the year would not, upon leaving a room on the north or east portion of the house to go into one in the south or west sides, feel any considerable change, if any, it would be but momentary, for the colors of the two would immediately blend or harmonize so as to produce a pleasing sensation. The effect of color thus has the power to some extent to equalize to the senses a feeling of nearly an even temperature.

CHURCH COLORS.

In referring to church decorations, much difference of opinion exists. Many hold as a fixed rule that churches in particular must have a somber monastic gloom. Such take the idea from visiting ancient buildings, the relics of past ages, which, on account of their walls being generally built of stone, and that stone work being the interior finish without plaster, such churches do, no doubt, while lighted by stained glass and heavy stone work in their windows, etc., cast a dull, melancholic gloom. But this result by no means claims it as a necessity that such cold, forbidding colors should be a standard to the present age.

And further we take the ground that dark somber colors have nothing to do with producing religious feelings or awe. Decorations, colors, etc., style or order, ought to be carefully selected and in good keeping, which should be such as to cherish a true sensibility of christian feeling, altogether free from all depressing circumstances or causes such as cold, raw, uncongenial mixtures have the natural tendency to produce upon the mind.

At the same time avoid all such colors as would be suitable for theater decoration. Rather choose a modest, pleasant class of tints, a medium between the two, neither too bright and lively nor too dull and monotonous.

PUBLIC HALLS OR LECTURE ROOMS.

The best class of colors for such buildings are, or ought to be, pleasant, light, agreeable tints, neither too warm, nor in the other extreme, too cold. They require to be colors easily lighted, pure mixtures, not muddy but airy. Beautiful gray tints for the ceiling panels; pleasant cool buffs or drabs for the divisions or stiles, which can be broken up well in neutral tints, all combining to produce a sweet harmony.

Ceilings so done require to have the walls in keeping, only giving your colors more tone or force, dividing judiciously the various tints throughout the cornice, etc. Artificial moldings always partake of the color of the stiles, and are always allowed for in drawing out the breadth of your stiles. The order you select will always guide you in finding the various members constituting the molding required, etc.

DWELLING HOUSES.

The interior decorations of dwelling houses admits of more latitude. Here the painter has ample scope for the introduction of variety, as all colors consistent with the art of house decoration can be used with impunity.

Still we would advise that colors of a chaste and pleasant character ought to be the general rule.

Let the panel of the ceiling be of a tone of color agreeable and in unison with all the other arrangements, for instance; ascertain the color selected for the upholstery, carpets, etc. (if already a furnished house), then the colors can be made up in complete harmony. You can judge at once those colors that will be suitable not only for the panel, stile and cornice, but also for the walls; and can also see what the contrasting shades ought to be to give the true tone and character to the whole.

For panels grays of various shades are employed, vary-

ing from the delicate French white to the decided French gray and lilac, compositions of white, blue, red and black.

As already mentioned, whiting for the base of almost all the shades required. Ultramarine blue, cobalt, Prussian and verditer being the blues generally used. Indian red, Venetian, vermilion, lake, carmine and sometimes orange mineral; but for large surfaces it ought to be avoided, as it will be liable to sink owing to its great density.

The only blacks to be relied on are the blue black and the Frankfort, or pure ivory black. Lamp black ought to be discarded, as it is generally foul and greasy.

Pink or rose tints are got by a mixture of red with white, employing any of the reds most suitable for the shade required; if very rich, carmine or lake, vermilion or Venetian red; Indian red, if not wanted bright.

GREENS.—Any good chrome green will answer; mineral and Paris greens are of the first importance when bright greens are wanted, and works very clean.

BUFFS OR DRABS.—A great variety of shades of that class or color can be attained by a mixture of yellow ocher, red, blue or black. Some introduce umber to great advantage in drabs or buffs. If wanted cool add more blue or black and keep out the red, or subdue it nearly.

Chrome yellow of various shades can be used, and if only used with discretion is a valuable color, but bear in mind that chrome is a color of great strength, and has to be used with caution and judgment.

These shades can also be improved if they are wanted warm and mellow, by the addition of terra de sienna, either in its native raw state, or calcined, known as burned terra de sienna; it gives a fine warm tone to those colors.

If cool buffs or drabs are wanted, umbers can be introduced with effect, both raw and burned, producing great variety of color in mixture with or without yellow ocher, chrome yellow or raw sienna. The Turkey umber is superior to the English or American, being a more pure earth and stands better.

BROWNS FOR SHADING, ETC.

Burnt umber, Vandyke brown, oxyde of iron (commonly called "colcother"), purple brown, burnt ocher, burnt sienna, etc. Burnt sienna and ultramarine in mixture; a beautiful shading color, not too much of the blue to show it.

Always recollect that for ground colors the mixed whiting is the base of composition.

In finishing panel work, where order is not entirely binding, colors can be introduced which has a very fine effect; such as parting lines, sometimes red brown, green or blue.

These are simply to divide contrasting or strong colors, and assist very much in relieving the whole work and general effect. But the pupil must be very cautious in introducing such auxiliaries, for many times good colors, fair workmanship and contrast has been destroyed by such introductions, placing such strong tints where they really were not required, or of an improper tone to produce harmony.

CEILINGS ORNAMENTED WITH GOLD.

Sometimes a ceiling is relieved by gilding. The center pieces, corner ornaments, a member of a molding, etc., are required to be so.

Then the student must select some of the projecting or prominent parts, and having sized in for gilding, after which he must have his cushion, tip, cutting knife, etc., all in readiness, also a ball of soft cotton, large camel hair brush for dusting off all the surplus gold, etc. Then place your gold leaf upon the cushion, take your knife and cut it into strips of a proper size, draw your tip across your hair (having first drawn a piece of pure tallow over the hair so that a slight touch will cause the tip to lift up and carry the leaf to the piece of work to be gilded), then use the ball of cotton to lay it down, and clean off with the camel hair brush, etc.

The size for gilding upon ceilings, etc., when a distemper ground is laid, no oil size can be used without first running all the member in with a preparation sizing such

as gum water, weak glue, or thin shellac varnish (bleached) so as to keep the oil size from staining or running. To obviate this trouble and save time an excellent size for such work can be made by intimately mixing with thick glue a little fine pure honey. This is what is called by the French artists "batture." They contend that this size hightens the color of the gold, and such experience will teach the student is the case; it also gives the gilding a fine luster, closely resembling burnished gilding.

PAINTING VESTIBULES AND HALLS TO STAND WASHING, ETC.

The walls must be prepared with oil paint, same as for any other painted wall, only the last coat must be "dead" or "flat;" that is, no oil used in the last coat, only spirts of turpentine. In the last or flat coat there ought to be a little good pale copal varnish, about one tablespoonful to twenty-five pounds of paint; this gives a better and harder surface to the wall, and bears handling much safer, for no man can fresco a wall entirely free of some casuality occurring, such as charcoal lines to dust off, a drop might fall from the brush, etc., and the varnish will enable the student to wash very lightly if anything should happen to require it.

Before the wall receives the last two coats, let the design or paneling be all correctly drawn out.

Then mix the colors to the required tints (in oil), lay in the panels first; then the stiles, and when thoroughly dry, put on the flat or last coat (spirit color). The work will be dry for paneling in a few days.

MIXTURE OF COLORS FOR THE PANELING OF WALLS OR VESTIBULES.

Common spirits of turpentine for the mixing of the finishing colors is found to work too spare, does not cover very well, and cannot be bound enough to stand the frequent passing upward and downward which is required with the brush in running moldings or lines.

Therefore the following mixture is found to answer the purpose very well, viz.: Turpentine, a little white wax,

a little mastic varnish, and a little fine pale damar varnish. The quantity of the varnish must be very small, otherwise a gloss would be produced which would not die down flat in drying; all that is required by such a vehicle is simply to cause the color to hold or set quickly, so that the work can be more expeditiously carried on.

A little practice will soon teach the student the quantities required, for it is not possible to give correct proportions for those mixtures; besides every painter has some particular mixture to which he prides himself. The above will answer all purposes.

In preparing old walls or ceilings sometimes there are stains, cracks, etc., in the plaster; these can be best seen after the old color has been removed by washing, which must always be done the first thing; then mend all the blemishes in the plaster with size putty if small, or if deep cracks, taking plaster of Paris and a little putty lime, enough merely to keep the other from setting too quick. Damp all the places with a brush and water, then apply the plaster with a small trowel or knife, and finally wash and smooth over the places to make good sound mendings. When dry, give a coat of shellac varnish to all the mendings.

After all the necessary repairs are hard and dry, if the ceiling or wall is not to have a coat of paint, a preparation coat in size will be necessary. This is a mixture of whiting with an extra quantity of melted glue, to which must be added a small amount of alum; give the plaster a full coat of that, allowing a full day to harden before the second coat is applied; in most cases the second coat is sufficient if the first coat has been nearly of the required color. But always have enough of size in the second coat to have it well bound, for it may happen that a third coat may be required to make a good fair surface.

Still it is highly necessary to avoid too much accumulation of color, as it is liable to produce a roughness or harshness, which is at once detected even by the inexperienced eye.

Always give a coat "full flowing." Never attempt to rub out the color, for such scantiness of color will be sure to ruin all your expectations and prove a failure.

NECESSARY IMPLEMENTS.

A marble slab, to grind all the colors not to be had ground at the color shops.

A good pallet knife.

A stopping knife.

A small trowel.

A square.

A set of straight edges.

A T square.

One pair compasses.

One scale for measurement. (Gunther.)

One foot rule.

Chalk line.

Colored chalks or crayons.

Charcoal for drawing lines.

Flat nailed stock brushes, or tin bound.

Round wire bound brushes for cornices, etc.

Sash tools, six sizes, from No. 2 to 8.

Flat French tools for drawing lines, etc.

Round quill or tin bound tools, various sizes, from small to large.

Sable pencils, long and short, to use on scrolls, flowers, center pieces, etc., and various other purposes.

An assortment of wood pails.

Stone pots, large and small.

Tin cups, large and small.

Tin cans, one dozen or two, assorted in size

Step ladders.

Tressels for scaffolds, assorted hights; planks, etc.

One glue pot, double made.

One tin basin, wire bottom, for straining colors after the size is put in to remove any extraneous matter in the color.

Any other necessary article omitted, can be supplied when needed.

And here I would sum up with a few useful remarks by way of conclusion.

Knowledge is the grand element of decision in all things, and no less so in painting; and we should neglect no means placed at our disposal of attaining that element.

The same avenues of information are open to us all that

supplied the minds of Rubens and Titian, if we will but resolve to apply them.

The peculiar feature of fresco painting is what may be called "roughness;" and what some people would apologize for on account of "want of finish," by saying that more finish is important, for that at a distance it would not be seen.

But this is a very unfair and insufficient view of the matter. Not only is there no occasion for more finish in fresco painting; but properly speaking it is highly finished already. It is a mere question of focus.

To finish a piece of work, is to regulate and complete the various parts in conformity to the whole, and this effect once accomplished, all beyond tends to undo instead of completing the painting.

By attempting more finish you would obtain less, for the real finish in fresco painting is gained by keeping the tints bold and firm, that they may blend well when reviewed from a distance.

TO PREPARE TRACING OR TRANSPARENT PAPER.

Take one quart of spirits of turpentine, one quarter of an ounce of sugar of lead finely powdered, shake it up and let it stand for two days; then pour off and add to it one pound of pure Canada balsam, set it in a gentle sand heat and keep stirring it until it is quite mixed, when it will be fit for use. Then have your paper ready on a smooth board, brush it over, and hang it up to dry. In about four days it will be fit for use.

This paper will be extremely transparent. The most suitable paper is bank post, and when for very nice purposes, use fine tissue paper.

COPYING OR TRACING SHEETS.

Take some hard soap and lamp black, and mix them together to the consistency of jelly. Brush over one side of any smooth paper with this composition and let it dry. Place the colored side of this paper upon a clean sheet on

a smooth table; over both these lay any design to be copied, and trace its outlines with a metallic or ivory point just sufficiently blunted to prevent its cutting the paper. The colored paper, wherever it is pressed upon by the point, will make a mark on the white sheet it covers, and the lowermost sheet will by this means receive the whole design.

Black lead, vermilion, or any other coloring matter may be employed.

In copying any ornament from the sheet, use the precaution to fasten your sheets securely, for a shift of any of them would make a false copy.

POUNCING ORNAMENTS OF ANY KIND.

Prick the outlines of any design to be copied with small pin holes, very near to each other. Place the design to be copied upon a clean sheet of paper, and dust it over with finely powdered charcoal from a muslin bag. The charcoal will penetrate through the pin holes, and upon lifting up the pricked paper, the design will be found upon the sheet beneath it. The pricked paper will serve many times, and ought to be carefully laid away for use upon some other occasion.

Correct copies of any scroll or design can be thus transferred to a ceiling or wall with ease, and saves all the trouble and time in repeating drawings.

STENCILING.*

Draw any design necessary to ornament flowered moldings, trusses, friezes, etc., and with a sharp knife cut out the principal parts of the drawing, only leave as much as will connect and keep together the sheet in due form, then take a short brush with the color required, and not too thin, pass over the sheet carefully avoiding the liability of under-blotting, when the design will be painted entire

*How to Prepare Paper for Stenciling.—Coat the sheets of paper with boiled oil first coat, then give them three more coats of oil paint, they will then stand the mixture of the water color and action of the brush.

(with the exception of the small parts where the connections were), which can be touched up with a small brush with the same color.

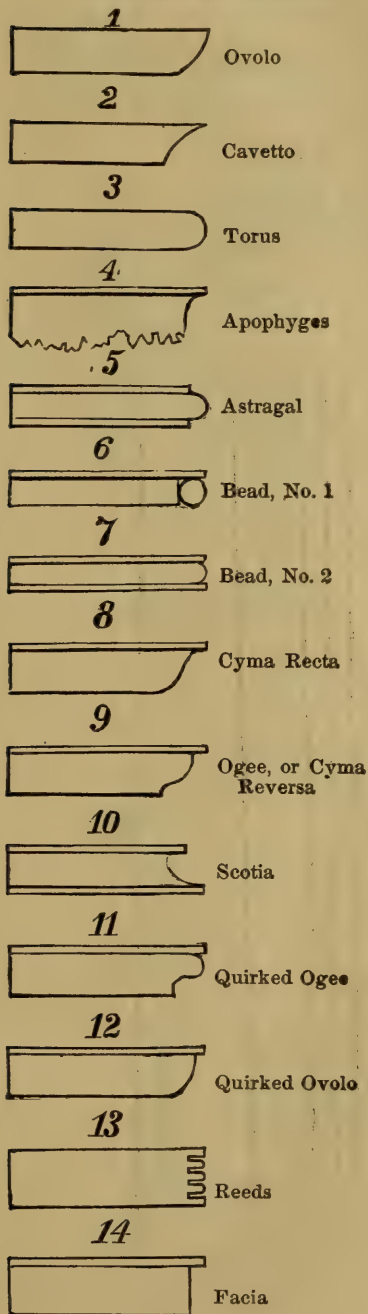
This method saves a great amount of labor, and for such pieces of work answers very well; all that has to be done is simply to put in the shade lines along with the others. Many ornaments are done in this manner, and to the fresco painter is a great economizer of time. Every appliance that can be adopted ought to be brought into requisition to lessen labor, and thereby add to the remunerative interests of physical action.

In conclusion, I would say, persevere and the result is sure.

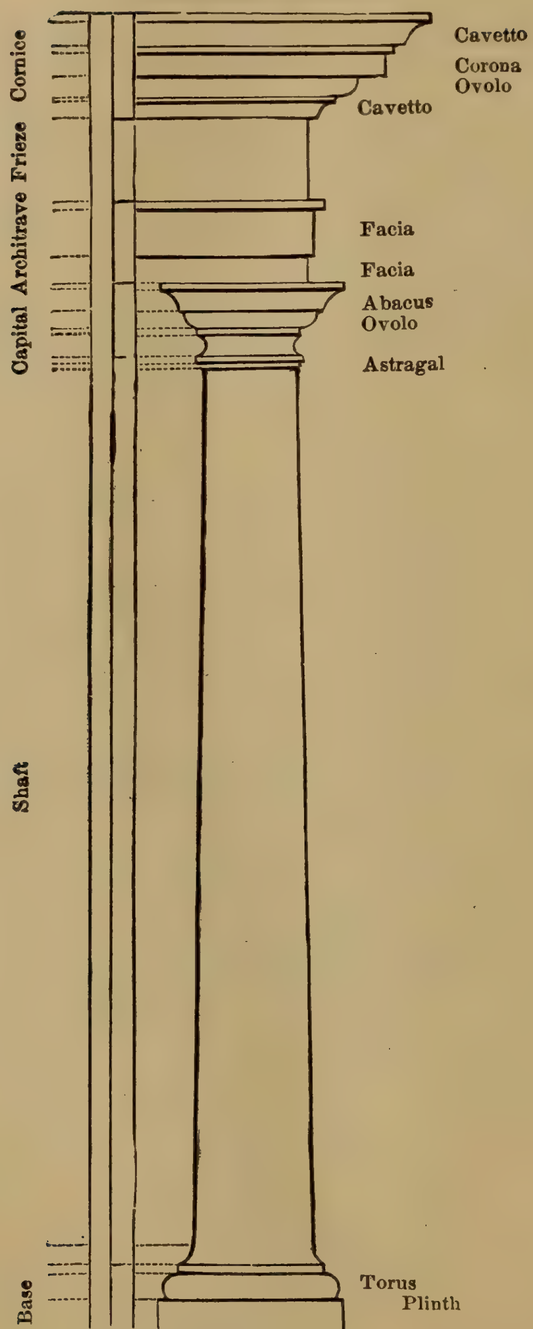
ORDERS OF ARCHITECTURE.

The painter of interiors has constant use for pillars, columns and pilasters. We give, therefore, a specimen column of each principal order of architecture, with the technical designations of each part. The painter must constantly remember that these are only flat representations of solid bodies, and he should study every fine row of columns that may come under his observation, and enlarge his knowledge by the study of some complete work on architecture; and following these pillars we give a few designs for ceilings in fresco. Also an ornamental scroll and a border for several colors. But the painter in active practice will constantly find use for larger collections of designs. He should also be ready with pencil and sketch book to copy anything new which he may see, and to invent designs for himself.

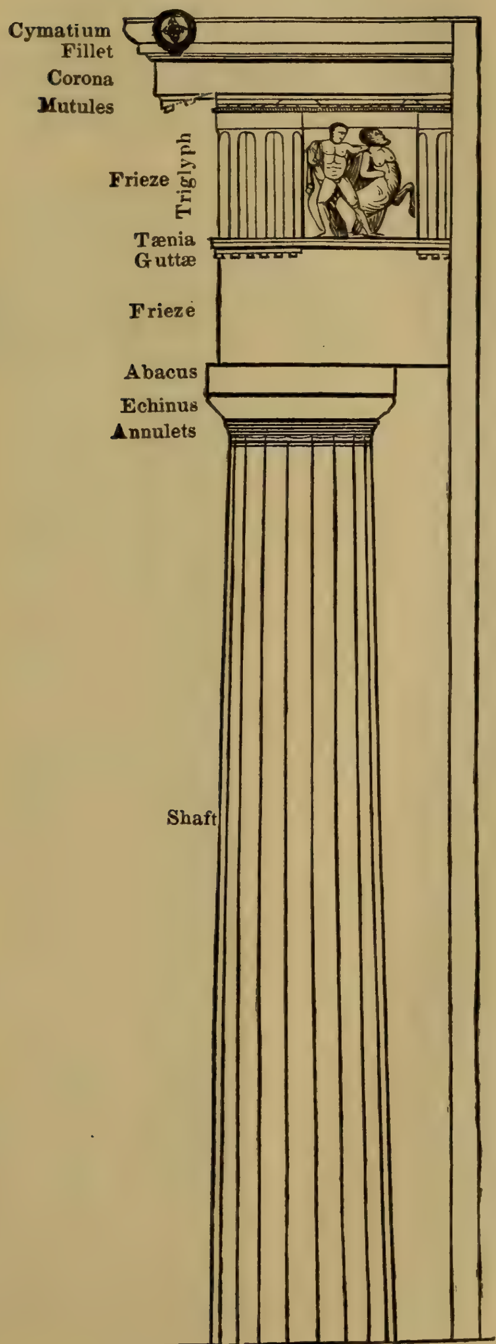
TUSCAN ORDER.



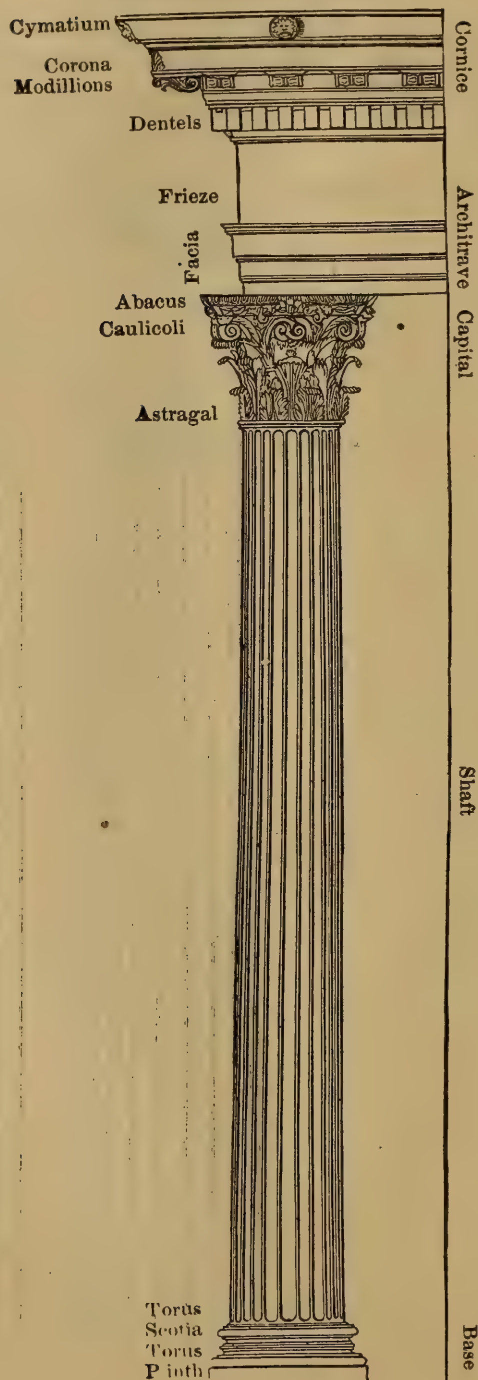
TUSCAN ORDER.



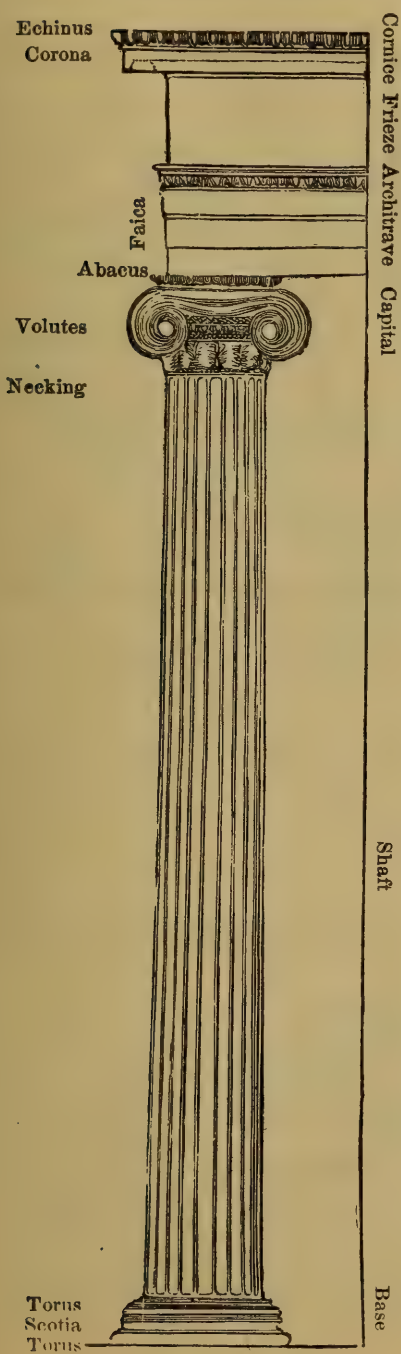
DORIC ORDER.


Cymatium
Fillet
Corona
Mutules
Triglyph
Frieze
Tænia
Guttæ
Frieze
Abacus
Echinus
Annulets
Shaft

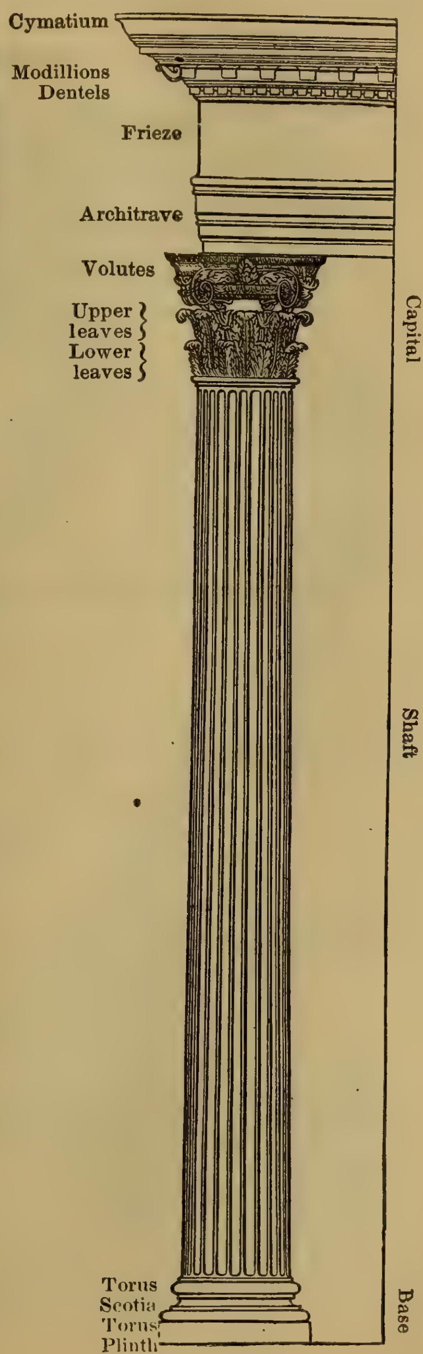
CORINTHIAN ORDER.



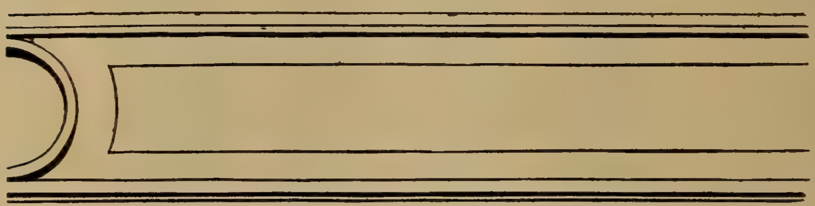
IONIC ORDER.

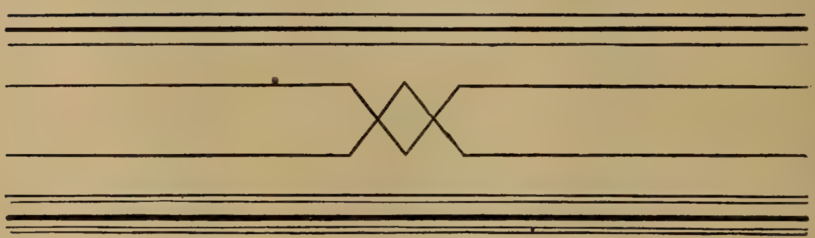


COMPOSITE ORDER.



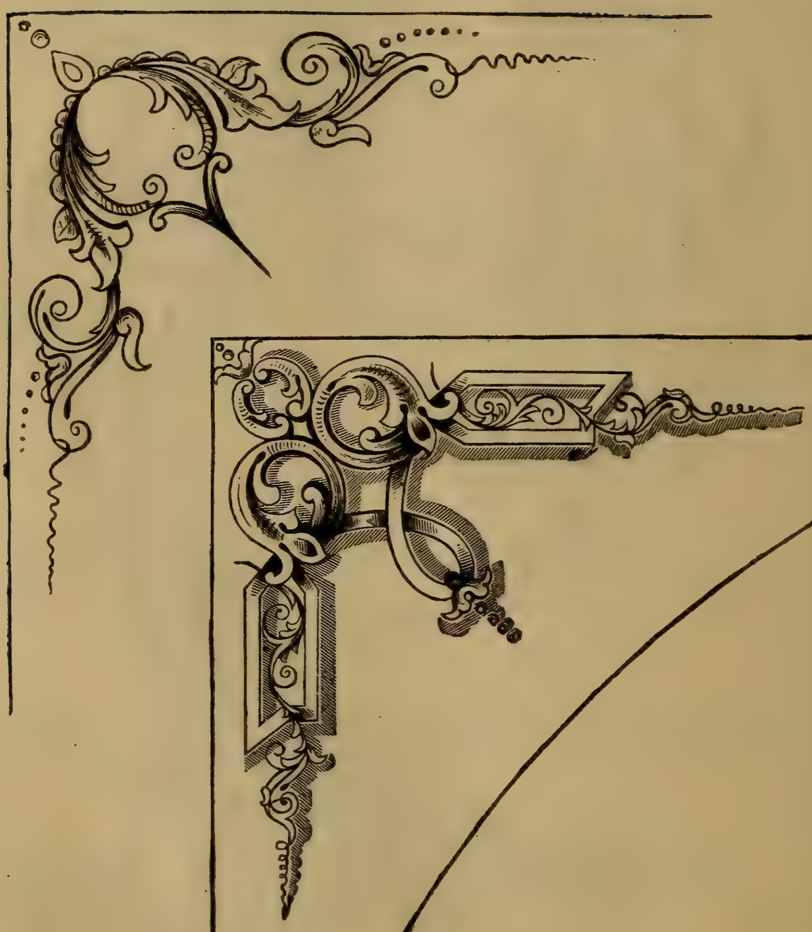
BORDERS.





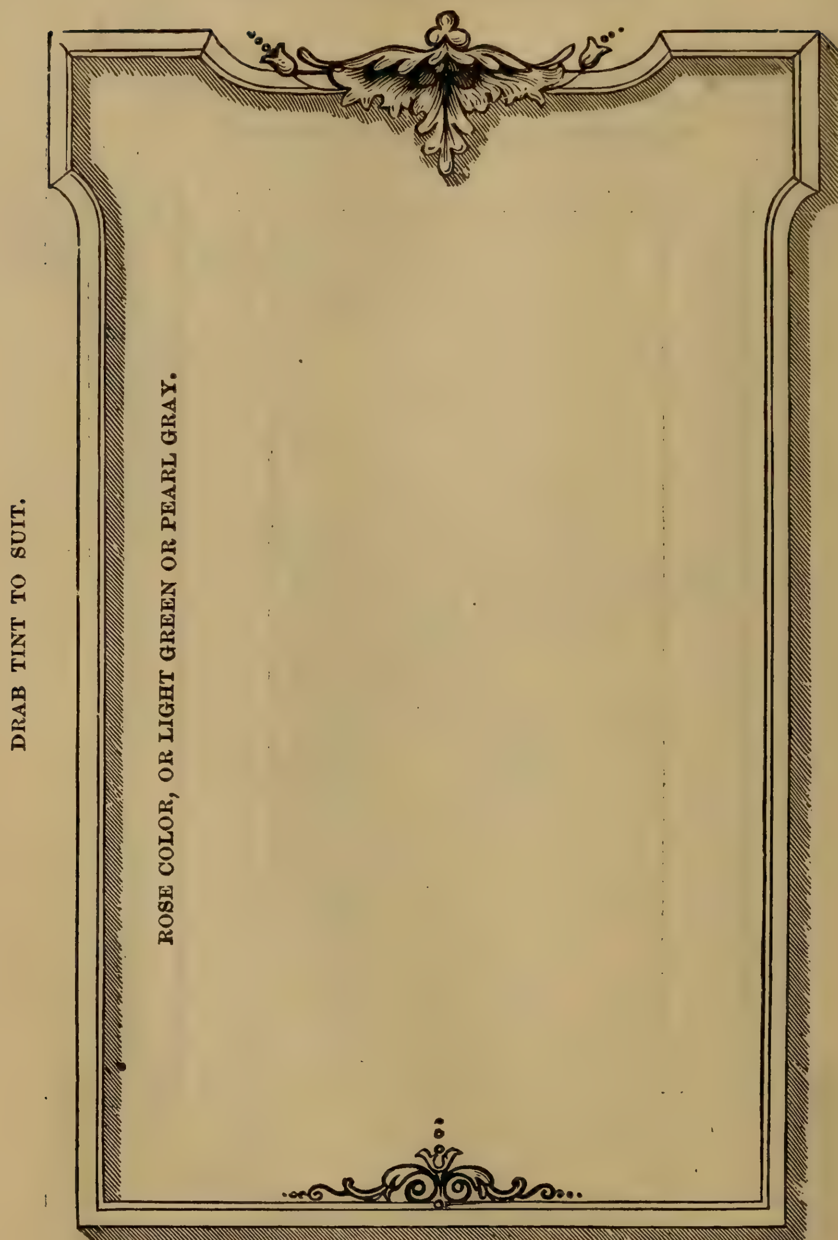
COMBINATION SCROLL.

CORNERS.

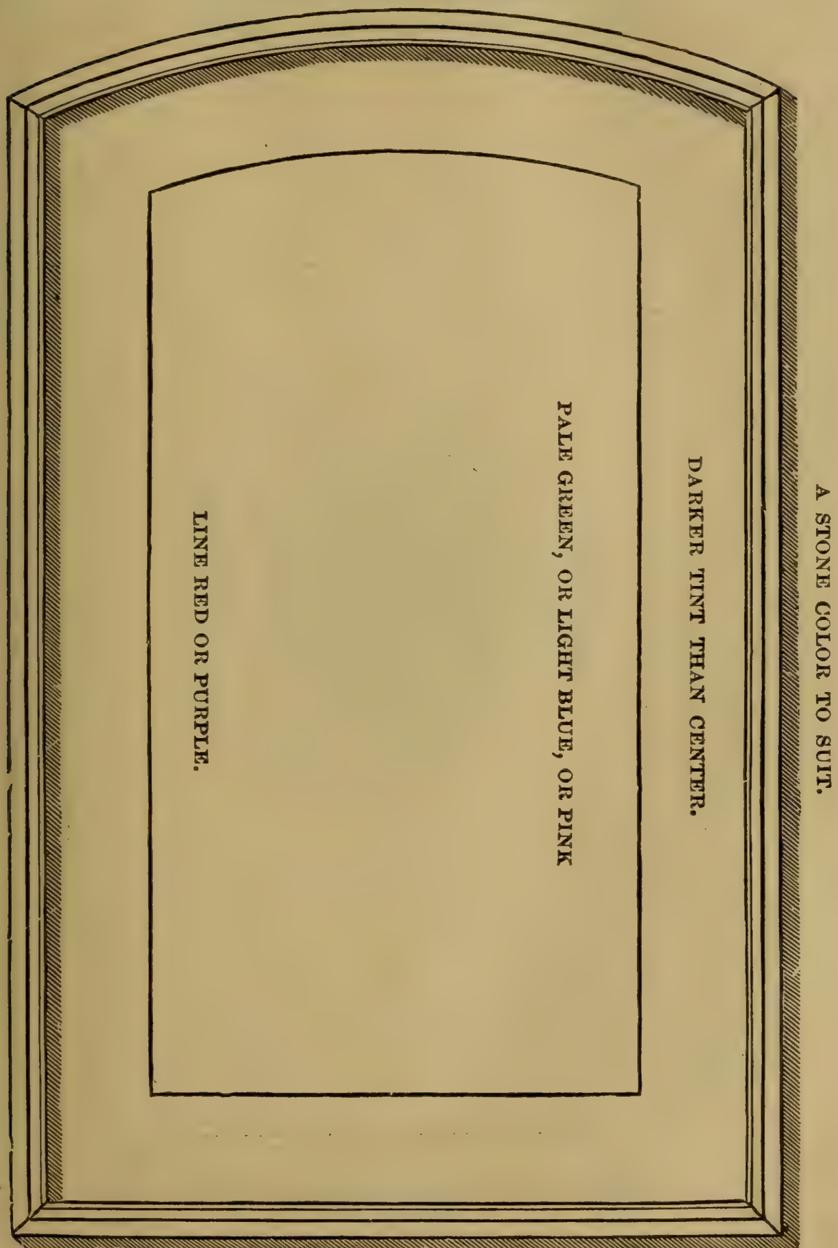


WALL DECORATION IN TINTS.

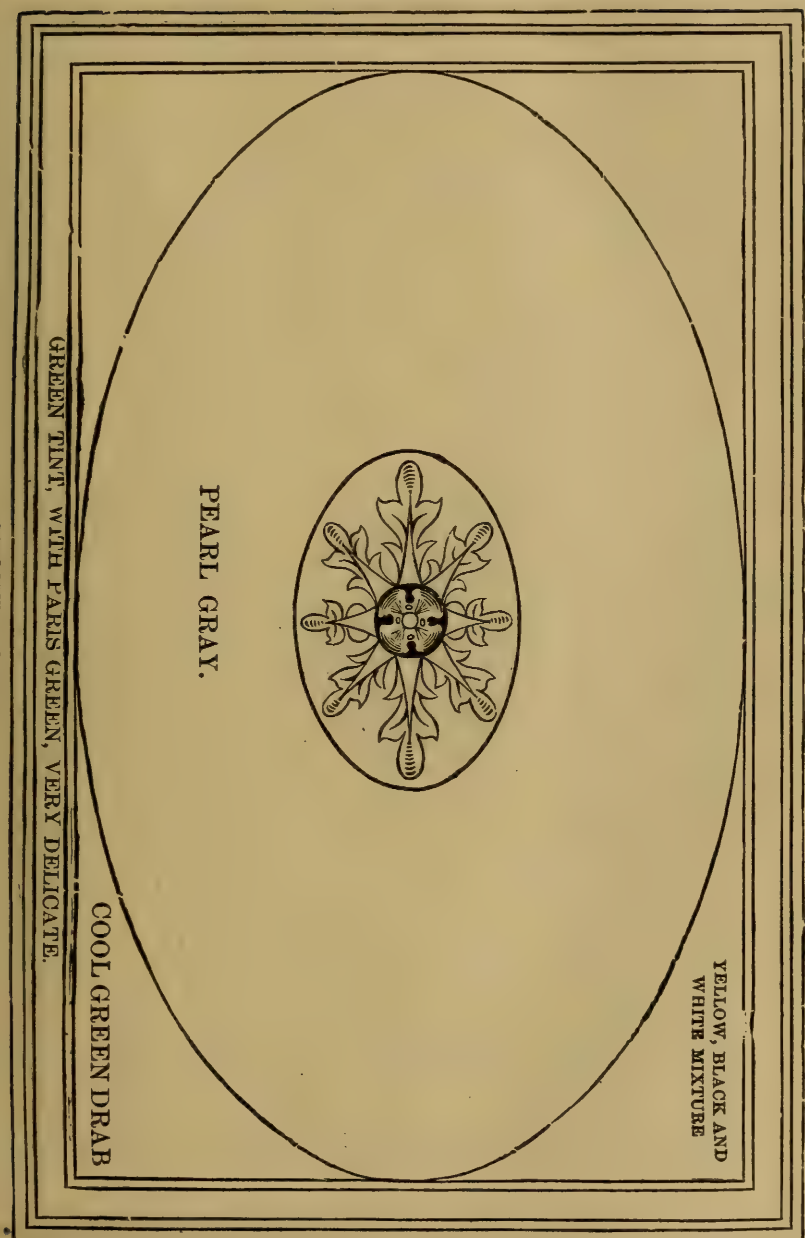
WALL PANEL DECORATIONS.

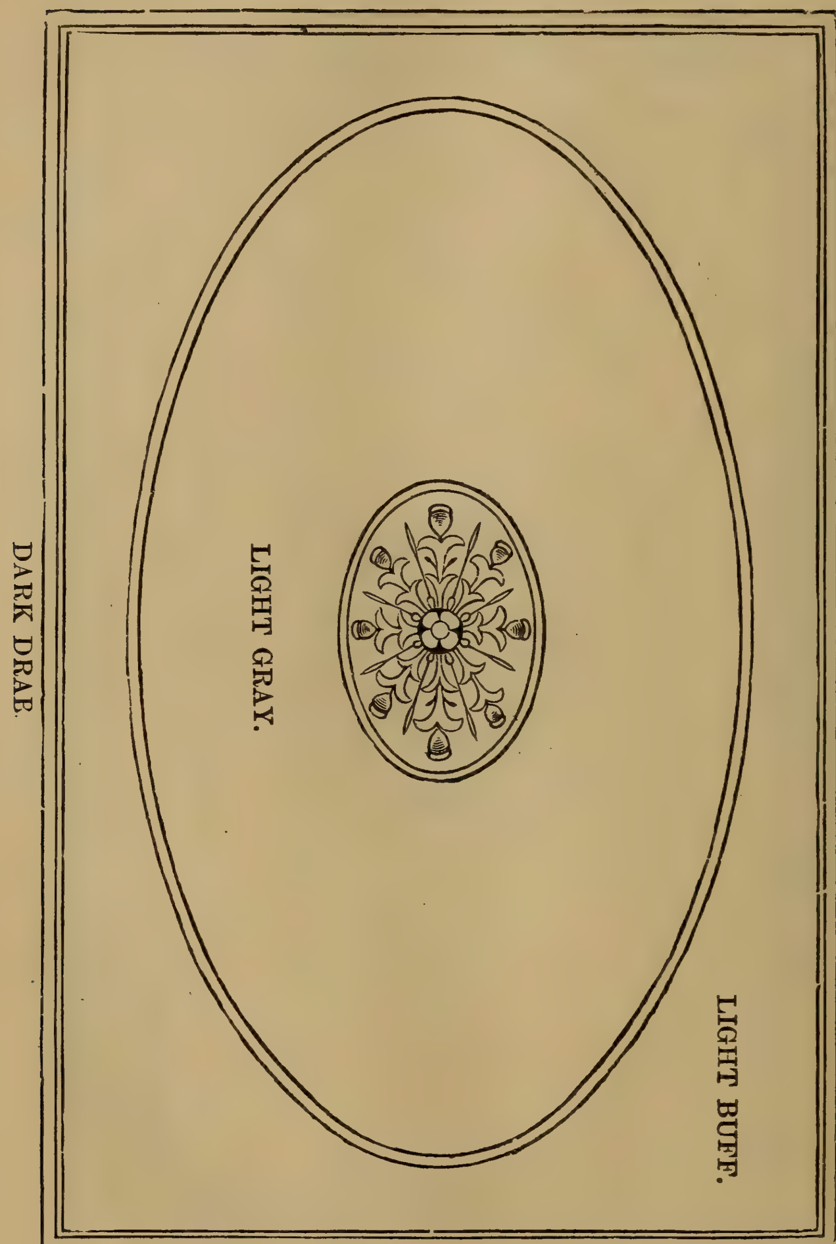


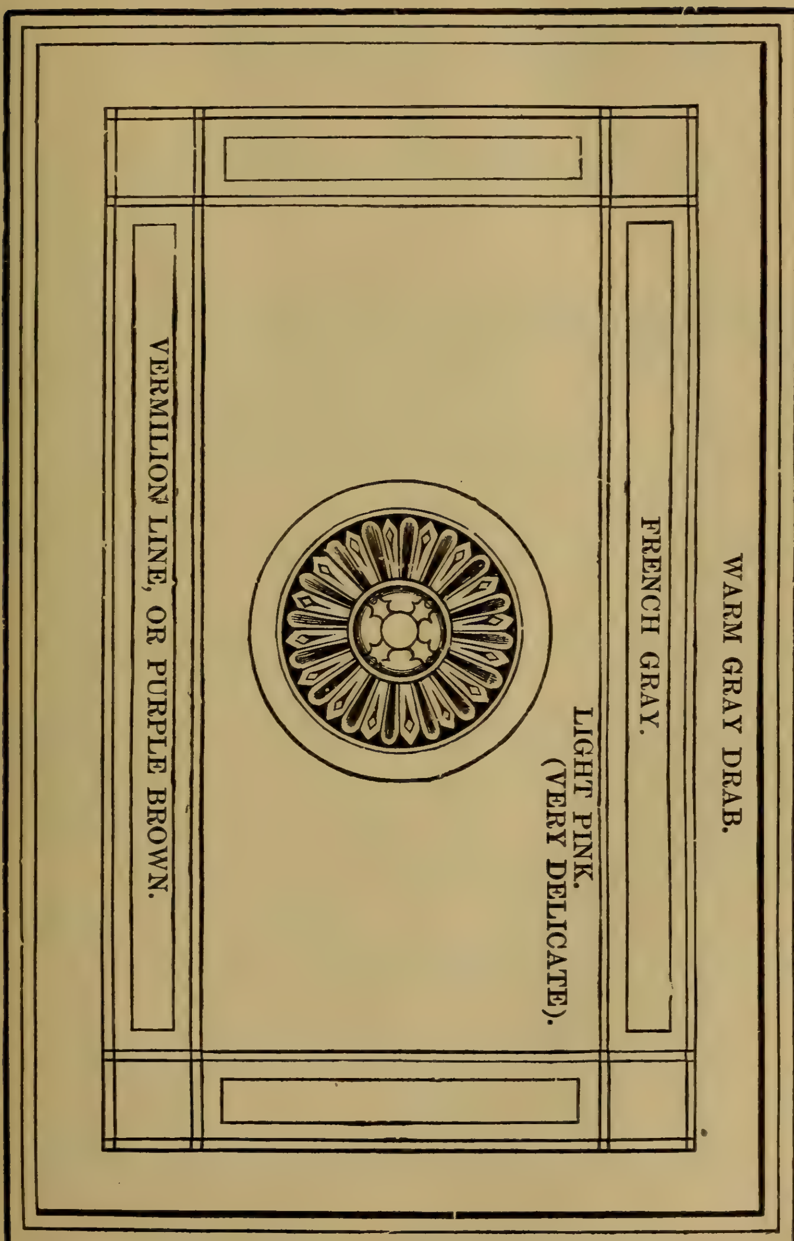
WALL DECORATIONS.



A BUFF IN HARMONY.


PEARL GRAY.
GREEN TINT, WITH PARIS GREEN, VERY DELICATE.
STONE COLOR.
COOL GREEN DRAB
YELLOW, BLACK AND WHITE MIXTURE


DARK DRAB.
LIGHT GRAY.
LIGHT BUFF.


WARM GRAY DRAB.
FRENCH GRAY.
LIGHT PINK.
(VERY DELICATE).
VERMILION LINE, OR PURPLE BROWN.

A COMPLETE SYSTEM

OF

COACH PAINTING.

This is a branch of the art of great importance, yet one but very imperfectly known to the masses. One reason for this statement is that coach painters generally keep a very close surveillance over visitors, few, if any, are allowed to enter their workshops, and no class of painters are so unwilling to communicate any of the principals or theories of their business.

House painting, sign painting, etc., are branches of the art that cannot be well concealed from the public gaze, for the operations are so common, and of every day occurrence, that any person of moderate ability can soon obtain sufficient information to enable them to do a passable piece of work, especially in house painting. Graining requires not only good judgment, a true sense of the various woods and marbles he wishes to imitate; but also the organ of imitation well developed. Sign painting being in part mechanical, has been acquired with more ease than many other branches of the art, yet there are some points got only by long practice and through the help of others in the same line.

But, as stated above, coach painting differs so much from any of the above in the method, mixtures, etc., that even a good clear knowledge of any of the others is of no use when applied to coach painting.

In starting with giving the pupil a correct idea of coach painting, it will be necessary first to mention the kind of materials, tools, etc., required.

In no branch of painting should more care and knowledge be employed than in selecting the most suitable stock before commencing a piece of work; for without paying strict attention to this fact, good work cannot be done. A first-rate coach painter cannot execute a piece of work to

advantage with poor materials; the paints must be of the best quality, varnish, japan, oil and turpentine dryers, etc.; let those be good and the chances are all in your favor.

MATERIALS REQUIRED.

White lead, B. B. brand, ground in oil.
Same quality, dry.
Japan dryer, No. 1.
Black Japan.
Body copal varnish (flowing).
Body (hard), for bringing up the work, for rubbing down and using in the previous coats, then finish with the body flowing.
Carriage varnish, Nos. 1 and 2.
Drop, or Frankfort black.
Chrome yellows, of all shades to orange.
Indian red.
Vermilion.
Venetian red.
Orange mineral.
Red lead.
Scarlet lake.
Crimson lake. }
Purple lake. } Coach painters' rose pink.
Yellow lake.
Carmine
Purple Brown.
Burned Umber.
Raw Umber.
Burned and Raw Sienna.
Chrome greens, assorted shades.
Olive, or quaker's green.
Ultramarine blue.
Prussian blue.
Cobalt blue.
French yellow (ocher).
Whiting, best quality.
Ground pumice.
Pumice in lump.
Rotten stone, very fine.

Tripoli powder.
Granulated zinc (putty powder).
Fine wheat flower.
Olive oil for polishing.
Brushes of suitable sizes, short for painting.
Oval bound varnish brushes.
Sash tools, assorted sizes.
Pencils, large and small (sable).
Long liners for striping (camel hair or sable).
For fine lines, long black sable.
Sand paper, assorted numbers.
Emery paper, for rubbing old work, viz.: iron, springs, bolts, shackles, etc.
Dusters.
A few tressels to stand bodies upon of a suitable hight.
A wheel stand, which is an upright mortised into a square block of wood, about two inches above the half diameter of the largest wheel; have a pin of iron put through the upright, a little less than the size of the axle, and long enough to hold the wheel while painting or when striping. And another, made with a block or stool, with an upright bolt or pin from the center, so as to place a wheel upon a horizontal position.
A bench for the flag and muller. A small paint mill attached to the bench for grinding colors.
A square putty knife.
A diamond pointed putty knife.
A pallet knife.
A flat file. }
A half round file. } for cleaning old work.
Flat broad chisel.
Flat scraper, or old plane iron, used when firing off old paint.
Varnish pots (tin), with a wire across the mouth to wipe the brush over.
Paint cans, assorted sizes.
Oil cans, etc., marked for boiled and raw.
Turpentine can.
Japan can.
Cloth, double milled, for rubbing the varnish coats.
Sponge and chamois skin, etc.

Having mentioned almost all the necessaries required to furnish a coach painter, I will now proceed with the general instruction for preparing a carriage for painting.

First, take and dust all the machine carefully before taking it into the paint room. Have two boards like small table tops connected by a bolt in the center, so as to revolve when wanted. Place these upon the tressels, then take the body off the under carriage and set it upon the small tressels before mentioned, then take off the wheels and let the carriage rest upon the axle on a tressel of a proper hight, same as the wheels; take the wheel stand and place upon it one of the wheels, then the work will be all easy of access and ready to commence painting.

In coach painting very little oil paint is required, and here is the difference that occurs between house and coach painting. Only two or three coats of oil paint is sufficient in bringing up the work. This we call priming. Just give as many coats as will carry out a slight gloss, no more.

The best oil for this purpose is good drying oil, say two-thirds oil and one-third turpentine, and have a little of the fine litharge ground into it, about two ounces to twenty pounds of paint. The litharge causes the paint to become hard, and rub down better than if only drying oil alone was used.

We mention litharge because it is the best dryer for this purpose. Patent dryer is, no doubt, convenient, being already ground, but it never dries paint so hard as litharge, nor rubs down with the sand paper so well, being more apt to hang to or clog the paper, and roll or draw upon the work.

After all is first coated and dry, take your sand paper and rub down very smooth, making sure to cut down all inequalities, ridges, or deficiencies in finish by the coach builder, otherwise by neglecting to do so on the first coat, you would have the mortification to find that those places would cut through in your second coat, thus losing your time to a considerable amount.

You now dust your work carefully, and mix up some putty (better make your own) with whiting and oil (raw oil) and about one-fourth part white lead, and work into it while kneading it, a little pulverized litharge to make it

dry good and hard. This is very important, as the putty should be dry, otherwise it would rub up in the process of the work, and spoil the entire job. Observe that the putty must be stiff, and well worked up, before using it. You now take your putty-knife and fill up every crack, crevice, knot hole, etc., etc ; level every inequality smooth and fine ; study rather to have your filling-up rather higher than otherwise, for you will put that all right when rubbing down the next coat, but if below the level, you have to commence puttying again. That is bad work, so be sure to putty carefully. All this done, then dust off the work again, previous to second coating. Should your color be too stout or thick, thin with turpentine, but be sure not to use thin color, for it not only covers badly, but rubs down very tacky.

For all dark colors, use a dark lead color for your oil coats—"merely black and white," but, for preparing for any such color as light green, let the color be light lead color.

If for a yellow, begin with white, or slightly tinted with a little chrome yellow.

In laying your second coat, be sure to lay it regular, not fat in some places and spare in others, but as far as possible an equal fair coat, and we would wish to guard you against one of the very worst faults a painter can commit, viz.: to leave full or fat edges upon any part of the work, such as the springs, shackles, bolt-heads, or nuts, or any part of the carriage, for if left by neglect, they will tell upon you at some stage of the work, and at a time, possibly, when you cannot well repair the evil done ; therefore be careful.

When this second coat is dry, examine minutely, that you have missed none of the places requiring putty.

The second coat being thoroughly dry, proceed to rub down with your sand-paper, using a finer quality this time, so as not to cut so deep, hoping that all projections have been cut down upon the previous coats. Now dust off your work, and commence to give the third coat, putting on a very tight coat (that is, rubbing it out well, not too much paint).

After the work is all dry and hard, you next proceed to

giving the filling up coats. Filling is a mixture prepared as follows: Take dry French yellow, litharge, a little white lead, whiting—say about one-sixteenth litharge—a small quantity of white lead, a small amount of whiting; a little red lead will also improve it; take your drying Japan and pour in as much as will nearly mix it; put in a very little drying oil, very careful not to have too much, otherwise the filling will be soft and tough; turpentine to thin to a suitable thickness, to make it spread like a stiff coat of paint. This filling must be laid full, a coat to flow on freely. A little practice is necessary to find out the exact quantities of thinners to be used in mixing good "filling up stuff." After all is right, commence to coat your body, laying it fullest where you see any hollow or want that you cannot putty very well, as this is really its use. Then, if a good job, coat your shafts, springs, wheels, etc., etc., etc., and when all is done over, let it stand until all is perfectly hard (try with your thumb nail); if it feels hard and don't peel up, it will stand another coat.

In the most of cases, two coats of filling will be sufficient. The last coat must be allowed to dry hard, as it has to be all rubbed down with lump pumice stone. Rub the pumice flat upon a stone before you commence rubbing down carriage work.

When the student begins to rub he is to be very cautious to avoid cutting through, and here he will find a "proof" whether or not he has paid attention to rubbing down carefully with his sand-paper, for if he has not, of course his pumice will cut in all places neglected, as stated above.

In rubbing down with lump pumice, you must use plenty water; keep your sponge in your left hand, and supply water whenever required; it will cut quicker, and not be liable to roll up, as it would undoubtedly do if not kept perfectly wet. Draw your finger or side of the hand over the parts you are rubbing and you will see when you have it done enough, that is, all perfectly firm and smooth. Then you have done all that is required. Take your sponge and wash off all the work; wring out your wash leather (chamois) and dry off the job; then if all is perfect, all filled,

the work will feel like a piece of ivory, quite smooth and level.

A panel or piece of coach work cannot be got level or fit for finishing without being filled up by this method, for the grain of the wood will always be more or less seen unless done so.

We now come to the next stage of operations, viz.: color.

Whatever color the carriage is to be painted, the color must be fresh ground, as it is a mixture that drys very quick.

If you want a dark green of the olive shades, you take deep chrome yellow and drop black; have your black powdered; mix the two together in a pot with the drying japan, and a little turpentine—not too much spirits at first, as it would not grind well if thin; put your mixture into the bench mill and grind it into a clean pot (always washing out the mill, to keep it clean), then see if the shade is of the kind desired; if too dark, you want more yellow, or *vice versa*; if the color is wanted warm olive or quaker's green, put in a little India or Venetian red.

Now take a clean brush, and make up the color to the proper thickness and commence work at once; as the color drys or sets very quick, be expeditious in laying it on. The same care is not now so necessary as regards fat edges, as the color will all dry hard. Still, avoid all careless or slovenly work; always work clean, if you want the work to look well. A small drop of drying oil can be used in very warm weather, if it should set too fast to allow time to lay the color, yet an expert never uses any oil, and it is better not to use any, unless you wish to let the work stand for a longer period of time than usual. By working the color free of oil, two coats per day can be given easily. Two coats of this color will be sufficient. I have often done a good piece of work with one flowing coat.

All plain colors are done in the same manner; all opaque colors that cover well require no more.

Greens, browns, olives, yellows, etc., etc., but for an ultramarine blue, the work has to be got up very differently.

You must ground up after your filling has been rubbed down, washed, dried, etc. with a coat in "oil," that is not

in "japan," using just so much oil with the color to keep it from setting too quick ; for such colors use sugar of lead for the dryer, in preference to japan dryers, as the color will be purer. Grind some good Prussian blue in oil, then add to a mixture of white lead as much blue as will make a ground dark enough for to bear the ultramarine blue, that is about as dark as you wish the carriage to be when finished. You now proceed to give a nice careful coat over all the work that is to be finished blue. When dry, if solid enough, it will require no more Prussian blue, but generally two coats are required.

When satisfied that your ground is good, take some of the best ultramarine blue, grind it on the stone with a little varnish, pour out some of your body flowing varnish into a clean pot, put in your ultramarine already ground, and with a clean brush mix well the blue with your varnish ; try if there is blue enough in it, and, if all right, commence to give a very regular flowing coat all over, and the colored varnish coat will flow on very evenly and give a tone and transparency, a depth of color which cannot be got by using full ultramarine alone. We always recommend two coats for a coach wanted in this peculiar color, second coat the same as the first, only before giving the second coat rub down all the work with ground pumice and water, with a cloth. You thus remove the gloss, and the next coat will lay and flow better. Let the work stand for a few days, then rub down again with ground pumice and water, wash, and dry with your skin, after which the work is all ready for picking out and striping, of which I will lay down general rules hereafter.

CLARET OR LAKE COLORS.

Your first coat is composed of vermilion and rose pink, in oil, as for blue. Filling all rubbed down, washed, dried, etc., dust clean, then proceed to give a coat ; this you will find to cover very well. When dry, give another light coat ; as soon as hard, rub with ground pumice and water, same process as for blue. Dust clean and nice.

If you wish a very rich light claret, you must calculate not to have too much rose pink in your ground color, for

if you do, you will not get the color you anticipate. But for dark clarets, use considerable rose pink. The student must pay attention to these important hints.

For the light shade, have some scarlet lake; grind in a similar way as directed for ultramarine; take the body-flowing varnish and put in the lake; mix well, and proceed to coat very carefully. This color sometimes takes three coats, but with due care, and a good brush hand, it can be attained with two coats.

DARKER SHADES.

Use more rose pink in the ground. Then, instead of scarlet lake, use the best crimson lake, and in the same manner as for the light claret; two coats will be enough if carefully laid. In all those colors got, the principal idea is to have a solid, true body, not shady but fair.

STILL A DARKER SHADE.

Vermilion, rose pink, a little ultramarine blue, for the ground. This is for a purple shade of claret. Ground good and solid.

Then grind some purple lake, same as above; put into your "body-flowing varnish;" two coats will be enough, if managed well. Should any imperfections appear, give another coat and all will be sure.

TO PAINT A CARRIAGE PURE CARMINE.

This is sometimes required for fancy machines, or fire-engines, hose carriages, etc. Many painters fail in painting with this very valuable color, and also through ignorance of how to use it. They very generally attempt to get the color by the use of the carmine alone. This color, if pure, is worth $3 per ounce.

Ground your work with the best English vermilion; see that the color is complete and solid.

Then take pure carmine, grind in a little drying oil, put it into the body-flowing varnish, and coat very carefully. It will take two coats to produce a solid, pure color.

By this method, one ounce bottle will do a whole machine, thereby saving a large amount of cash for carmine, and time, which is capital, and at the same time produce a very superior color to anything that can be realized from pure carmine.

All the above colors are produced by what is called in the trade, glaizing.

A green can be done in the same way; laying a light green for a ground, then use the green lake to glaize, as in the clarets, carmines, ultramarines, etc.

"JAPAN BROWN."

Grind drop black in japan; add to it a little vermilion, just enough to see it. This makes a very rich color, and looks very well with vermilion lines, or an orange line; either looks well.

OXFORD BROWNS.

Take a little chrome yellow, white lead, India red, best ocher, burned umber, just white enough to be seen; yellow is the principal color; red to warm it, umber to give it the brown tone.

Many varieties of Oxford brown can be made by the adding more or less of the leading colors of the compositions.

CHROME GREENS OF ALL SHADES,

Or greens composed of chrome yellow and Prussian blue. Let all the greens be ground in japan. Being opaque, they all work in that way remarkably well, and by far superior to any attempt in oil.

FAWN COLROS.

Yellow, red, a little black, or a little burned umber may be added, even burned terra de sienna is sometimes put in the mixture. Coach colors vary from the shades in general use by house and sign painters. They are strictly a class of colors peculiar to that branch of the art, and are

tied to no common established rule. I have seen a carriage painted with the cleaning of several pots, forming a color that would puzzle almost the best colorist to imitate, yet it looked first rate, although a nondescript! We advise the adoption of the principle, as it not only produces varieties of color but will be a point of economy of great importance, as much valuable color is often thrown away through this want of judgment, into the common receptacle for all left colors called the "smudge barrel."

DRABS.

Any variety can be made to suit the most fastidious.

Composition drabs, red black, and yellow, umber; also some mineral colors, from which many fine tints can be made. Raw umber and white alone constitute a good cool drab, and can be toned either with a little "chrome," or "red," so as to be either rich, or warm. Any fancy shade of color wanted can be mixed with perfect ease, for very soon the student will acquire sufficient knowledge of color to mix any shade he desires.

A GOOD, DURABLE, CEHAP COLOR.

Vermilion and Prussian blue. This is an easy way of getting at a cheap, rich purple, with a small quantity of white lead.

ANOTHER.

Vermilion and drop black makes a cheap plum brown, or claret; covers well, and looks and stands well, although far deficient to the claret got up by glaizing with crimson lake, already mentioned; but for low priced work looks very well indeed, and will not cost one-half the price; as much time is saved, and the materials moderate.

Having given a general outline of colors, we propose to next point out to the student the manner of "breaking out," or "picking out," as the trade term has it.

That is, laying in the lines or stripes, "blue ground." If a large carriage, with heavy wheels, draw lines (with

japan mixed color) with ground Frankfort black, from three-quarter inch to one inch broad, on every part of the carriage, spokes and springs, filloes, hub, etc., etc., etc., shafts, etc. Then, with a light primrose, or light orange color, draw fine lines about three-eighths or a quarter of an inch from the broad black line, showing that separating distance clear and distinct of the blue between.

And great care is required in drawing the fine lines, so as to have them true and equi-distant. Wherever the broad black line is drawn, carry your two fine lines all through the work, bolt heads and nuts black with one fine line round the edge.

For an extra finish a fine line can be drawn down the center of the black, a deep orange, or pure white, or gold. This style looks very beautiful.

In drawing fine lines, as a general rule, the color is ground in drying oil, as it combines more closely, and gives out from the pencil much better, and makes the lines more regular, although for work in a hurry, where the lines are not required to be so fine, japan color will do.

GREENS.

Generally pick out with black, and if a light green, black lines will be enough. If a little more expense is to be gone to, run up the center of the black lines with a white, and not too fine. This makes a good neat finish.

If a dark green, pick out with black, and run very fine line on each edge of the black, three-eighths of an inch off the black. With a very bright green, that looks very nice indeed, or any other color to suit the taste of the artist.

CLARETS.

Almost all colors of this class are picked out with black. Fine side lines are either vermilion or a rich orange; or side lines of orange, not too dark, and a vermilion line run up the center of the black; or one large black line, with a gold line up the center, about one-sixteenth of an inch strong.

FAWN COLORS.

Pick out with black, fine line with white on each edge, or brown drab shade—any color that will show well and be in harmony.

OXFORD BROWN.

Pick out with black, fine line vermilion or medium tint of chrome yellow with a perceptible touch of red in it. Sometimes part the black line with white down the center.

JAPAN OR PLUM BROWN.

Vermilion line looks best of any color, and for cheap work requires nothing more.

BLACK BOLTS AND NUTS.

Some dark colors (very dark) look well to pick out with drab, or fawn color, edge lines vermilion, center line black. This looks very clean and showy.

OLIVE, OR QUAKER'S GREENS.

Pick out generally with black, fine line with white orange, or light green.

DRABS OF ALL SHADES.

Pick out with black, fine line with vermilion, or orange high colored. Extra finish, center line white.

PURPLE.

Pick out with black, fine line with a bright line of orange or lilac, or with vermilion.

These remarks apply to most of the colors in use by coach painters, although there can still be a greater variety of work done than we can enumerate, which can be put in practice at any time.

The next operation is to varnish. Now, it appears a

simple process, but it requires not only great practice but considerable "knack." One thing must be understood and put in practice, viz.: never use a dirty brush or pot; keep your brush in a narrow tin case or canister in raw oil; cut a hole in the top large enough to admit the handle of the brush, and bore a small hole through the handle to admit a piece of wire to hold it up from the bottom, for if the point of the brush touch or rest on the bottom, the bristles will be turned, consequently will not lay the varnish close and smooth. Wash the brush out clean with turpentine before using.

Then pour into your pot (if for the under carriage) some carriage varnish, and work in your brush thoroughly; then start either upon your wheels or carriage first, it is of no importance which; lay a full coat, never pinch it, for a half coat of varnish is always poor and hasky, and never yields a good gloss. When all your carriage work is done pour back the varnish into your can, then take some body varnish and give your first coat to it also; then let all stand until it is quite hard and dry.

Then take your ground pumice and water and cloth rubber (woolen cloth) and wet it well; then have some pumice on a board or plate convenient, dip the cloth in the pumice and commence to rub every part of the varnish, taking great care not to run through any of the ground, or lines, but merely to remove the gloss. This we call flatting the work. Then wash of all the pumice thoroughly, and dry with the wash leather, which must always be used wet; just wring it out of the water as dry as you can, and it will dry best; never use it dry. You now examine the work carefully, and see if you have cut through anywhere; if you have, you must touch it up with japan color, so as to dry soon, then you can begin your second or last coat.

A very good job can be done with two coats. Give a very full coat, almost to running, and lay it off very clean. When you do the wheels, a full coat, take and spin them upon the standard for some time, indeed until nearly set. This plan is not generally practised, but it gives a very superior gloss, and secures the danger of the varnish running, a very important point, and one not easily got quit of, and about the worst eyesore that can occur.

If this second coat do not please you, flatten the coat again with your pumice, cloth, and water; wash and dry as before, and then give a reasonable coat carefully.

In good jobs, where it is required to be polished, you must commence with fine ground pumice; do not depend upon the fineness of the pumice as sold, but, for this purpose, take and mix with water, then grind it upon the flag very fine, then there will be no danger of scratching.

Rub just enough to bring all to a perfect smooth state, all brush marks removed, then wash very clean and dry well; then dust carefully. But always before washing, drying, etc., sweep out your floor, and sprinkle with water to lay the dust. The same precaution is necessary always before varnishing, for dust getting into the varnish will cause the work to look "seedy," or lousey, as the painters call it.

Your next operation in polishing is to take rotten stone, finely sifted through muslin, and mix in olive oil; take a piece of fine cloth for a rubber, and rub every piece very carefully, which will again restore the gloss by reducing it to fineness again; rub off the rotten stone occasionally with the side of your hand or finger, and you will see if all is polished enough.

Then, if all right, take and wipe off with a piece of soft old cotton cloth, free of dust, then take some fine wheat flour, and a piece of fine flax full of the flour, rub all the work over so as to take up all the oil and rotten stone that is upon the work, then with an old silk handkerchief wipe all the work up pretty smartly, and if all has been done right and with care, the work will have a very fine, brilliant gloss.

Some finish with putty powder, and others use Tripoli instead of pumice. But the above process answers every purpose that is required. But when the work is intended to have a polish and burnish finish, always give an extra coat of varnish, as it is not good policy to attempt polishing on two coats of varnish, for such work is generally left from the brush if clearly varnished.

FACING PUTTY FOR SMALL FLAWS.

Mix whiting, a little white lead, litharge a small quantity, with japan dryers, and add a little drying oil—very little; work this very well, not too hard, and use it quickly as it sets very soon. This putty will rub down very soon, and not tear up with the pumice stone or sand paper.

FIRING OFF.

Firing off is a term used by painters. Some use a gas burner attached to a rubber hose pipe, so as to direct it to any portion of the work required to be cleaned off. The heat causes the paint to soften, so that it can be easily removed by the blunt chisel, or plain iron; then can be reduced to evenness by rubbing down with lump pumice and water. Another method is to take a brush with turpentine, lay on a coat upon one part, then, with a match or candle, set fire to it. When the old paint becomes soft enough, blow out the flame, and remove with the chisel, etc. Another way is to hold smoothing irons to the part, and, if very hot, the paint will soon soften so as to be easily removed.

In conclusion, I would state that by attending to the instructions here given, and by a little practice, any man of moderate ability, a steady hand, etc., will very soon have the satisfaction of turning out a good piece of coach-painting. Striping, if well done, tends much to the beauty of the work, so the student will have to practice this department with care. Hold the pencil between the finger and thumb and gauge with the fingers, keeping the thumb uppermost, and drawing the hand backward; by this means he will draw the lines straight and quick—one pencil full will run a whole spoke, from the hub to the feloe, all but a small piece, which he must join, by drawing from the feloe to the line.

CAR PAINTING.

By R. McKEON.

The Priming Coat.—The priming coat of paint on a car is of as much importance as any succeeding one, and perhaps *more.* I have seen good work ruined in the priming by little or no attention being given by the painter to the mixing and applying of the first coat. The foundation is the support, and on that rests your success or failure. The priming should be of the proper materials, and not picked up from old paints which have been standing mixed, and must necessarily be fat and gummy, for such is unfit for use on a good job, and will have a decided tendency to spoil the whole work.

Special care should be exercised as to the priming, and it should be put on very light, so that it may penetrate well into the wood.

If lead be used, two coats should be given to the car before it is puttied, as it is best to fill well with paint the nail-holes and plugs, as well as defects in the wood, so that moisture may not secure a lodgment, which otherwise will cause putty to swell, although sometimes unseasoned lumber will swell the putty, and as it shrinks, the nail remains stationary, and of course the putty must give way.

Puttying and Leveling the Surface.—In mixing putty, which may be a small matter with some, take care to so prepare it that it will dry perfectly hard in eighteen hours. Use ground lead and japan, stiffening up with dry lead, and whatever coloring you may require in it to match your priming coats. The next coats, after the work is well puttied, should be made to dry flat and hard. Two coats should be applied, and for all ordinary jobs or cheap work, sand-papering is all that is necessary for each coat; but when a good surface is required, I would recommend one coat to be put on heavy enough to fill the grain, and before being set, scrape with a steel scraper. The plain surface is all that requires coating and scraping with the heavy mixture; for this coat, which we call "filling," I use one-half ground lead and any good mineral which experience has shown can be relied upon. This scraping of the panel

work will fill the wood equal to two coats of rough stuff, and saves a great amount of labor over the old process, when so much rubbing with lump pumice-stone was done. Sand-paper when the filling is thoroughly hard, and apply another coat of paint of ordinary thickness, when, after another light sandpapering, you have a good surface for your color.

Rough coating on cars has gone almost out of use, and I believe that but few shops are now using it to any extent. My experience is that paint has less tendency to crack where rough stuff is left off. I do not claim that the "filling" was the principal cause of the cracking, if it was properly mixed, but I believe the water used in rubbing down a car with the lump pumice-stone injures the paint, as it will penetrate in some places, more particularly around the moldings and plugs.

Coloring.—The car being ready for the finishing color, this should be mixed with the same proportions of dryer as the previous coat, or just sufficient to have it dry in about the same time. A very great error with many car-painters is using a large portion of oil in the under coats, and then but little, if any, in the finishing coats; this has a decided tendency to crack, the under coats being more elastic. I always aim to have color dry in about the same time after I have done my priming; by this plan, I secure what all painters should labor to accomplish—very little liability to crack. Work will, of course, crack sometimes, after being out a few months, or when it has repeated coatings of varnish; aud using a quick rubbing varnish on work will cause it to give way in fine checks quicker than anything else. Many of the varnishes we use are the cause of the paint cracking, and no painter has been wholly exempt from this trouble.

Japan Dryers.—The most common cause for paint cracking is poor japan, which is the worst enemy that the car-painter has to contend with; the greater part of the japan that we get is too elastic, and will dry with a tack, and some of the "japan gold-size" we have has the same fault. A little more care in the manufacture of japans would give us a better dryer, and few would object to the additional cost. Japan that I have frequently had I found

to curdle in the paint; it would not mix with it, but would gather in small gummy particles on the top. Work painted with such material cannot do otherwise than crack and scale, and the remedy lies only in getting a good pure article of turpentine japan.

White Lead.—In regard to using ground lead, car-painters differ, as some prefer to grind their own in the shop. I use the manufactured lead, and my reasons for doing so are that it is generally finer than any shop can grind it with present facilities, and it has age after grinding which improves its quality. You can also get a purer lead and with more body than you can by grinding in the shop, which is a fact that most painters must admit; I have tested it very fully, and am convinced on this point.

Permit me to make a few suggestions here in regard to the mixing of paint, which may not fully agree with others' views. There is just as much paint that cracks by putting it on too flat as by using too much oil. I have seen some painters mix their finishing color so that it was impossible to get over a panel of ordinary size before it was set under the brush, and consequently the color would rough up. Color should be mixed so that it will not flat down for some time after leaving it, and then you have got some substance that will not absorb the varnish as fast as it is applied to the surface. This quick drying of color is not always caused by want of oil in it, but because there is too much japan, and a less quantity of the latter will do better work and make a smoother finish. Give your color forty-eight hours to dry between coats; I always give that time unless it is a hurried job and we have very few such jobs in the shop, as experience has fully demonstrated that it is poor economy to hurry work out of the shop before it is properly finished.

Oils.—In car-painting, both raw and boiled oils are used, and good work may be done with either, but I would recommend oil that is but slightly boiled in preference to either the raw or the boiled. After it is boiled, if it is done in the shop, let it stand twenty-four hours to settle, then strain off carefully; this takes out all the impurities and fatty matter from the oil, and it will dry much better, nor will it have that tack after drying that you find with com-

mon boiled oil. Use the proper quantity of dryer in mixing your paint, and a good reliable job will be the result. In car-painting, I would never recommend the use of prepared colors which are ground in oil, as nine-tenths of such colors are ground in a very inferior oil, and they may have been put up for a great length of time, in which case they become fatty and invariably crack. These canned goods do not improve with age as lead and varnish do. Finishing colors should all be ground in the shop, unless special arrangements can be made with manufacturers to prepare them, and the color should be fresh, not over six or eight days old after being mixed and open to the air. Enough may be prepared at a time to complete the coating on a job, but when color stands over a week, it is not fit to use on first-class work, as it becomes lifeless, and has lost that free working that we find in fresh mixed colors; such color may, however, be used upon a cheap class of work, or on trucks, steps, etc., so that nothing need be wasted in the shop.

VARNISHING.—Three coats of varnish over the color are necessary on a first-class coach. The first coat should be a hard-drying varnish put on the flat color; the quick rubbing that some use I would not recommend, but one that will dry in five days (in good drying weather) sufficently hard to rub, is the best for durability. After striping and ornamenting the car, and when thoroughly washed, give a coat of medium drying varnish, let this stand eight days; then rub lightly with curled hair or fine pumice-stone, and apply the finishing coat, which is "wearing body;" this will dry hard in about ten days, after which the car may be run out of the shop. It should then be washed with cold water and a soft brush, and it is then ready for the road. In varnishing, many will apply the varnish as heavy as they can possibly make it lie, when, as a consequence, it flows over and runs, or sags down in ridges, and of course does not harden properly; this also leaves substance for the weather to act on. It is better to get just enough on at a coat to make a good even coating which will flow out smooth, and this will dry hard, and will certainly wear better than the coat that is piled on heavy.

Varnishing, we claim, can be overdone, some painters'

opinions to the contrary. We have heard of those who put two and a half gallons on the body of a fifty-foot car at one application, and we have also listened to the declaration made by a member of the craft, that he put two gallons on the body of a locomotive tank. Such things are perhaps possible, and may have been done, but if so, we know that the work never stood as well as it would if done with one-half the quantity to a coat. In varnishing a car, care should be taken to have the surface clean; water never injures paint where it is used for washing, and a proper attention to cleanliness in this respect, and in the care of brushes used for varnishing, will insure you a good-looking job.

Suggestions on Regulation of the Shop.—Perhaps your shop facilities for doing work are none of the best, but do the best you can with what you have; select, if possible, a still, dry day for varnishing, especially for the finishing coat. Keep your shop at an even temperature· avoid cold draughts on the car from doors and windows, wet the floor only just sufficient to lay the dust, for if too wet, the dampness arising will have a tendency to destroy the luster of your varnish. Of course, we cannot always do varnishing to our perfect satisfaction, especially where there are twenty-five or thirty men at work in an open shop, and six or eight cars are under the process of painting, when more or less dirt is sure to get on the work.

A suggestion might here be made to railroad managers, which is, that no paint-shop is complete where the entire process of painting and finishing a car has to be done in one open shop. A paint-shop should be made to shut off in sections by sliding doors, one part of the shop being used exclusively for striping and varnishing. I know from experience that nine-tenths of the railroad paint-shops are deficient in this particular, and still we are expected to turn out a clean job, no matter what difficulties we are compelled to labor under. Many further hints might be given in regard to this matter of shop facilities and conveniences, but as it is not here my object to argue the point, I leave it with this brief mention.

Proper Care of Cars.—In regard to the care of a car after it has left the shop, I think more attention should be

given to this than is done on many roads. The car should not be allowed to run until it is past remedy, and the dirt and smoke become imbedded in the varnish, actually forming a part of the coating, so that when you undertake to clean the car you must use soda or soap strong enough to cut the varnish before you succeed in removing the dirt. Cars should be washed well with a brush and water at the end of every trip; this only will obviate the difficulty, and these repeated washings will harden the varnsih as well as increase its luster.

We know that in washing a car, where soap is required to remove the dirt and smoke, it is almost impossible to get the soap washed off clean, and if it is not, the hot sun and rain will act on the varnish and very soon destroy it.

Cars should be taken in and revarnished at least once in twelve months; and if done once in *eight* months, it is better for them, and they will require only one coat; but where they run one year they will most generally need two coats. Those varnished during the hot months will not stand as well as if done at any other time. Painting done in extreme cold weather, or in a cold shop, is more liable to crack than if done in warm weather.

Paint dried in the shop where there is a draught of dry air passing through it, will stand better than that dried by artificial heat; and you will find, by giving it your attention, that work which has failed to stand, and that cracked or scaled, was invariably painted in the winter season or in damp wet weather. I have paid some attention to this matter, and know the result.

Publishers' Note.—Haney's "Book of Scrolls and Ornaments" has many designs especially for Car painting, and **is already adopted in several prominet shops.**

THE

FURNITURE AND CABINET FINISHER.

POLISHING MATERIALS.

PREPARATORY polishing materials, previous to any painting, graining, staining, varnishing, or any other finishing operations, most useful to the wood-finisher, are sand-paper, glass-paper, pumice-stone and rotten-stone. A good surface on wood is commonly obtained with the aid of fine No. 0 sand or glass-paper. It is well to chalk the back of the sand-paper, both because the workman can hold it easier and because it seems to toughen the paper. Sand-paper becomes too brittle by being kept in a very dry atmosphere. When this is the case, moisten the back very moderately with the tongue or otherwise.

For use on large, flat surfaces, it is expedient to draw the sand-paper over a flat cork about three to four inches square and about an inch and a quarter thick. Where the grain of any wood is apt to rise after the sand-papering, it is well to wet the surface of the wood after the first sand-papering; to let it stand an hour or two, and then to repeat the papering with an old piece of paper. To do this a third and a fourth time is sometimes necessary for a first-rate result.

Another method of preventing the grain from rising is to give to give the work, after the first sand-papering, a coat of thin shellac varnish. This, when dry, is sand-papered off with the finest paper or pumice-stone and water. What is left in the pores very effectually holds down the grain.

Pumice-stone is one of the most useful of the polishing materials, whether for furniture in the white or for the reduction of a painted coat. Be careful when se-

lecting, to have it, if in the stone, of a uniform quality, if in powder, free from grit. On raw surfaces it is always used in combination with water. It may, if needed, be readily cut to shape, so that a molding may be pumiced almost as easily as a flat surface. For this work the stone is almost always used, and as the water causes a rise of the grain, the work is allowed to dry, and where oil does not damage subsequent coats of color, the finishing touches are done with oil and pumice-stone, after the water has dried out. With oil the work of polishing a surface with pumice stone is much slower than water. On varnished or painted surfaces pumice-stone is used with water or oil, in the stone or in powder, to cut down the surface. With water it makes a *bright* finish on rubbing varnish, and with oil a *dead* or *matt* finish.

ROTTEN STONE

is used mainly in powder. It is a finer material than pumice-stone, and is employed generally after the latter, to bring the surface nearer to a state of absolute smoothness. It is used in combination with water or oil, like powdered pumice-stone, and with the same purpose.

Powdered starch is used after "oiling off" very fine work, partly with a view to polishing, and partly with the intention of absorbing the oil used.

All other polishes, excepting perhaps fine brick dust for turned mahogany, may be dispensed with, for with the above the workman has all he needs.

One caution must, however, always be observed. If a coarse material is to be followed by a finer one, *all* particles of the former must be wiped off or there will be a painful scratch.

Turners find that generally the shavings of their work give sufficient polish to their work—that is mahogany shavings for a mahogany job, and so on. This does not affect the color of the wood. To highten the color of a poor piece of mahogany, they will use brick dust or powdered red chalk. The latter is also sometimes used on rosewood. But in general the shavings answer the purpose fully. German workmen

sometimes use shave-grass. Also powdered cuttle-fish bone. But there is no special advantage connected with either of them.

PUTTYING.

The qualities of good putty are that it should not shrink after it is put in; that it should not "fly" from the place in which it is put, and that it should bear cutting down without rubbing up, when pumice-stone or sand-paper goes over it, and that it should not dry too slowly. Workmen have their preferences, and careful workmen like to make their own, so as to be sure of the ingredients. It should be ground like paint on a stone devoted to this purpose only. We give the following formulas:

General Use.—White lead (keg) and sifted whiting with sufficient japan to make it work.

Quick Dryer.—White lead (dry) in rubbing varnish; bears the pumice stone well.

Quick and Hard.—(Under colors or in colored wood.) Umber and white lead, equal parts in japan. If the wood is rather red than brown use red lead instead of umber.

Smooth Putty.—(For use in dark wood, in places hard to reach, or where the fit is slightly defective, in curved parts, &c.) Lampblack, one-third; dry white lead, two-thirds; mixed in linseed oil. Where the natural color of the wood is to be preserved, holes may be puttied with the sawdust of the wood mixed with moderately thick *light-colored* glue. It will dry hard and bear the sand-paper well, and carries a coat of any finish as well as the wood itself.

Two parts beeswax, 1 part black rosin with sifted umber or venetian red, to give the color of the wood, is used to fill cracks in mahogany. It takes French polish or varnish. Shellac melted into a crack or hole by the aid of hot wire is perfect and takes any finish.

Lampblack is greasy as purchased, and a slow drier; it may be freed from its grease by putting in it a saucer, pouring alcohol over, and setting it a-fire. Let

it burn until it burns out. This makes lampblack available in many cases in which its ordinary greasy condition would render it useless.

NON-SHRINKING—FOR DARK WOOD.—Mix whiting, Indian red and lampblack in equal parts with carriage varnish, adding a small piece of beeswax to the putty; heat the same and pound it with a mallet until thoroughly amalgated.

HARD PUTTY, QUICK DRIER, STANDS PUMICE-STONE.—Whiting and w. lead 3 parts each : litharge 1 part. Mix in japan and add a little boiled oil.

Puttying should be done after the first or priming coat in painted or varnished work. See that sunken nails and screw heads get their due share of this first coat—otherwise the putty will either fly or shrink. The putty knife should be large enough to need only one application when puttying. It is advisable to have several sizes in the shop.

GLUE.

Glue is considered by many to be stronger if a little chalk is mixed with it. Dealers take advantage of this and mix the chalk with it when manufacturing it; they thus obtain the price of glue for a commodity worth about three cents per pound. China clay is also one of the adulterants of white glue. Others prefer to chalk a joint before glueing it—as mixing chalk with glue makes it apt to clog. Glue should run freely when about to be used—and should be as hot as possible. If glue chills too quick—an ounce of loaf sugar to a pound of glue is a remedy.

Sheet glue, to be prepared, should be cracked up to a convenient size for the pot, covered with water five to ten minutes; the water then poured off, and the glue allowed to rest a few minutes to absorb the water on the surface. (The object of this is to have it all melt about the same time.) It should then be put into the usual glue pot with very little additional water until melted. If not thin enough, water may then be added. City mechanics, however, prefer the *ground glue*, which can

be obtained at supply shops. This is quickly prepared, water and all being put into the pot at once.

The oftener glue is melted—if not scorched—the better it is; if scorched, it is better thrown away.

TO PREVENT GLUE FROM STICKING TO THE SIDES OF POTS.

A few holes bored in a glue pot in a horizontal line, near the rim, will allow steam from the boiler to enter it, and thus prevent the glue from solidifying on the side. The holes need not be bored all round the pot, as it is handy to be able to pour glue out of one side without wasting it.

If an extra strong joint is required between two large surfaces, a sheet of the thinnest muslin, or paper, glued between the two will answer the purpose.

Glue boiled in skim milk is said to resist water. Proportions: 1 pound glue; 2 quarts milk.

LIQUID GLUE.

For small jobs, 2 pounds best glue dissolved in the usual way in one quart water, and 7 ounces nitric acid added, kept corked.

Another.—Good glue, dissolved in good cider vinegar. Keep corked.

Another.—Good glue, dissolved in ether, should be kept fluid, even if closely corked. Good for immediate use.

WATER-PROOF GLUE.

Pure (unvulcanized) rubber, cut small, 15 grains; chloroform, 2 ounces powdered gum mastic, ½ ounce. For small fine work. Cork close.

Another for coarse work.—Glue melted as usual, 1 quart; boiled linseed oil, 1 pint; litharge, 2 ounces mix well.

Another.—Glue melted as usual mixed with boiled oil to one-fourth of its weight, and enough Grafton or Prince's paint, umber or red ochre, to allow it to work freely.

Another.—Air-slacked lime 2 ounces, mixed with 4 ounces linseed oil, boiled to a sirup. Pour out to cool on

any metallic or smooth stone surface. Will harden in this way and keep any length of time. Warm like ordinary glue when needed.

GLUE FOR INLAYING BRASS.

To a pint of common glue add two tablespoonsful of finely-powdered resin, and the like quantity of washed rouge-powder. Incorporate the whole well; it will hold the metal much better than plain glue.

Strong glue for inlaying is made by, first melting in the usual way, the best brown glue and then adding a solution of 1-2 ounce isinglass in 1-2 gill best vinegar.

VARNISHING.

The varnishing room must be free from currents of air, dust, damp, and the smell of stables. The dust mischief is well understood—that of damp not so well —yet the presence of unusual moisture in the air will cause the varnish to cloud, and the ammonia arising from the smell of stables will quickly affect the varnish, as the gums are soluble in ammonia, which is always largely present in the vapor arising from stables. The varnishing room should be swept when there is no work with a fresh coat of varnish in it, with a long-handled brush instead of a broom, moderately moist sawdust being scattered over the floor, with a long easy slow motion, As much of the place as can be conveniently reached should from time to time be wiped with any old soft cloth, such as a towel. Where work is removed from the varnishing room to dry, the sweeping can be done in the evening to advantage.

The temperature of the varnishing room should be not less than 70 degrees, and 72 degrees Farenheit is still better, and it should be kept evenly so. Currents of air and sudden drops in temperature will cause poor work. Varnish brushes should be kept in the varnish which they are used for. This may be accomplished in several ways. A good plan is to have an air-tight can in which the varnish pot with the brush, plunged up to the wires into the varnish, may be set. This obviates the use of *oil* as a cover for the varnish. In the ordi-

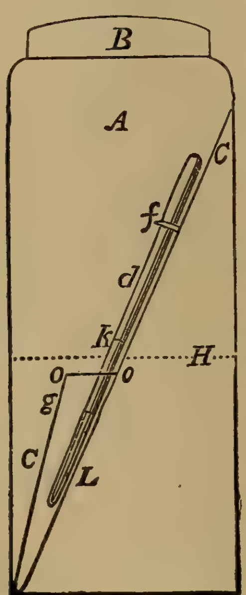
nary way the brush is plunged in varnish, it is true, but as the surface is covered with oil to prevent the varnish from "skinning over," the brush in being withdrawn takes up some of the oil. This takes time to rub out—and as it can never be entirely done—it always reduces the quality of the work more or less. The brush should not stand on its ends in the pot, but should be suspended by a wire running through its handle and laid across the top of the varnish can. Another method of preserving the varnish brush in good condition is the invention of Mr. W. H. Stewart, Orion, Wis. He speaks of it as follows in that excellent periodical, *The Hub*, of March, 1875:

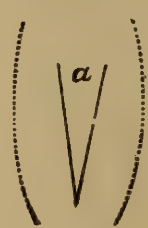
"I prepared a brush-holder, which I describe below, put the brush in, and filled the holder full of varnish; then set holder in a can of raw linseed-oil, just deep enough to allow the oil to flow over the varnish, and about one-fourth inch deep, to prevent the varnish from drying out or getting thick and heavy. The oil being lighter will not mix with the varnish enough to reach and penetrate the brush. When I am ready to use the brush, I carefully lift the holder out of the oil-can or jar, thus allowing the oil to flow off from over the varnish in the holder; then lift the brush out of the holder, wipe out what varnish there is in it, and I am ready to proceed immediately. I can thus take out my brush, and be working successfully in less than two minutes, and I find the brush just as I left it. I can leave it for any length of time, and in cold or hot weather all the same. I choose to employ for my oil-dish a glass jar, with large open top, covered with a tin cap (such as grocers keep candies in), and I have it tall enough to take in the brush, handle and all, and allow the cap to go on. Then all is safe from dust, and it is very convenient to see through the glass, and examine the condition of things in the jar without lifting the cap. The brush-holder is made of a strip of tin about an inch wider than the brush, turned up at the bottom end, so as to form a cup deep enough to take the brush in, up to about midway of the binding, and not let the hairs reach the bottom of the cup. Let the tin extend high enough on the back to reach the top end of the brush-

handle, and cut a slot in the tin toward the top of the brush-handle, as in small cut. Dotted lines represent the up-right tin back; *a* the pointed tin formed by cutting; turn up *a*, throwing out the point, and bore a hole through the brush-handle, and hang brush on the tin point, *a*. That will keep the brush at all times just deep enough in the cup of varnish, and brush and holder can be handled at any time without disturbing the brush."

See drawing of the complete apparatus.

A represents the glass jar; B tin cap; *c c* brush-holder; *d* brush; *f* tin point, on which hangs the brush. Dotted line H shows the top surface of the oil in the jar; *o o* the top surface of varnish in holder; *k* top of binding of brush, and L the hairs of brush."





This is a very sensible method of keeping the varnish brush, and conquers the oil difficulty entirely. It was invented for the use of coach-painters, but will answer for cabinet-makers as well.

If varnish does not flow freely it should never be *thinned* by adding anything to it; it should be warmed.

Varnish brushes are now made so good by all first class brush makers, that it is unnecessary to speak of them in detail. In varnishing the strokes should be as long as convenient with an even bearing, the brush moderately full and the work done as quickly as possible consistent with good workmanship. If a coat of varnish is to be followed by another it is always advisable to give it as light rubbing of pumice-stone and water, if only for the sake of making the next coat *lie* well.

Some further information as to varnishes will be found under the general head of Finishing.

DARKENING.

It is frequently desirable to deepen the color of a part of a piece of furniture to match with the rest. This is more particularly the case when a piece of old mahogany, oak or walnut furniture has been repaired.

1. A simple lime whitewash is generally the most effective for this purpose. It is laid on with a brush or rag, and its effect watched. Wipe off the lime as soon as the desired depth of color is obtained.

2. Soda, potash, or ammonia, dissolved in water or in alcohol, produce the same effect. Ammonia in alcohol, is quicker than when dissolved in water. What is called an oak stain is made by adding to a quart of water 2 ounces each of potash and pearlash This is a very good stain, but should be used carefully, as it blisters the hands and softens brushes. It should be corked up. A lighter stain may be made by adding more water.

3. Bi-chromate of potash is a very handy and good darkener, and should be kept on hand of different degrees of strength, as for instance, one bottle with the proportion of an ounce bi-chromate to a pint of water; another with an ounce to a quart, and still another with an ounce to a quart and a pint. It will be found very useful where much matching is required; as is also

4. Permanganate of Potash, which is used in the same way, and should also be kept on hand in different strengths. This is specially useful on cherry, which it sweetens beautifully.

5. The vapor of ammonia (hartshorn) is also a very

effective darkener, especially applicable to new oak which it is desirable to match with old wood. The process is to place the work in a box or small room, excluding the outside air by papering all joints of windows, doors, &c. Before shutting the door place a large pot of liquid ammonia inside, taking care the furniture does not touch the walls, and the color will be light or dark, according to the length of time and strength of ammonia—which should be very strong; a day is usually sufficient for the fumes to darken the wood.

The liquid ammonia may be made by dissolving the ordinary carbonate, as bought of the druggist, in water or alcohol. This is rather costly, but amateurs who are very particular about their work, do not always mind that item.

6. A decoction of tobacco stems will give a good brown—as will also coffee, and both may be made as light as desired. Either, if used, should be applied hot.

7. Oak can be readily darkened by a solution of green vitriol (sulphate of iron). It must be used carefully, or it will produce a greater effect than is desirable. The color produced in this runs toward black instead of *brown*.

8. Raw linseed oil, colored with Brazilwood dust (red oil), is used to darken and sweeten mahoghany and rosewood. The oil is poured over the dust, which gradually yields some of its color to the oil. Some workmen make a red oil by simmering annatto in linseed oil (raw) for a day. It makes rather a weaker color than Brazilwood. For rosewood alone some use linseed oil colored with logwood dust, like red oil. Linseed oil by itself is a darkener.

9. Nitric acid in solution answers as a darkener. The proportions may vary from 1 ounce acid and a pint of water to 4 ounces acid and a pint of water, according to the depth of color required. It gives a mahogany red or brown color to light colored woods and deepens the color of mahogany itself. It is a favorite with French workmen.

10. Lunar caustic (nitrate of silver) serves as a dark-

ener of dark woods. Dissolve in water, a half ounce in a pint of water, give a light wipe with sponge, and expose to the sun till dry and dark. The color given is brown, approaching black, and the effect must be watched or it will be too strong.

11. A decoction of walnut shells will deepen new oak to any shade from brown up to almost black. It will bring up sap walnut to harmonize with deeper colored wood; acts well on ash and most light colored woods, soft or hard.

12. An artichoke (the tuber or root), cut in half and rubbed upon any of the hard-woods, when new, will darken them. It is said to give a good oak color to pine.

13. Apply soft soap in its natural condition. This is merely a slower way of applying potash.

PREPARATION OF THE WOOD.

Previous to the application of any of these darkeners the work should be finished up sharp and clean. In most cases it will be required that the work should have a light sand-papering with very fine or worn sand-paper between the several operations—for it will often require a repetition of the application, especially on soft woods, of the darkener to produce the required effect. Wood darkened or improved by these processes shows better under a wax (dissolved in turpentine) or oil finish than under varnish. Linseed oil, (raw, as before said,) indeed, or beeswax in turpentine—is oftentimes a sufficient darkener itself. Either of these gives a fine, rich old appearance to all new wood. (See Finishes.)

14. There are occasions when, as in oak, ash, or walnut sap, the parts that are too light do not respond nicely to any of the above processes. In such a case the best plan is to make a thin solution or paint of raw umber and turpentine, and to give the light part a thin coat thereof. If the color does not match use a pinch of rose pink, vandyke brown, or burnt umber, according to the necessities of the case.

15. A very thin solution of asphaltum in turpentine will have the same effect, only it looks raw and shows

the trick of the trade unless varnish is to follow as a finishing coat. To modify this solution to suit wood with a reddish undertone, it may be mixed with a stain or dye made by pouring alcohol over finely ground red sanders (sandal wood.)

BLEACHING.

It is sometimes more feasible to bleach a small part of a job, especially in repairing, than to darken a larger portion of the work. This can be effected by brushing over the wood a solution composed of one ounce oxalic acid in a pint of water, letting it remain a few moments and then wiping dry. The operation may be repeated if necessary. A few drops of nitric ether, or a quarter of an ounce of tartaric acid will assist the operation; or a hot solution of tartaric may be used alone. Lemon juice will also whiten most woods. Cut the lemon in half and rub the cut face upon the wood. When the bleaching has been effected and the work is dry give a thin coat of shellac or French polish, as the light and air acting upon the bare wood will bring back the original color. If the wood obstinately resists bleaching it may be lightened by mixing a little fine bismuth white, flake white or ball white (the cleansing balls sold by druggists) with the shellac, and give it a thin coat. This whitens, but it also somewhat deadens or obscures the grain and is therefore not so good as the bleaching method.

STAINS.

SIZE STAINS.

These are colors fixed by the aid of glue in the solution. They are employed for the purpose of giving a color to cheap work in soft woods, such as chairs, bedsteads and common tables, ordinary bookcases, store fixtures, &c., &c. The colors usually wanted are walnut, mahoghany or cherry color; though oak is occasionally sought for, and even a rosewood.

FOR MAHOGHANY.

16. Dissolve 1 pound of glue in a gallon of water, and stir in 1-2 pound venetian red, and 1-4 pound chrome

yellow, or yellow ochre. Darken with the red and lighten with yellow, as desired. If the venetian red does not give a sufficiently dark look put in a pinch of lampblack. Apply hot.

OAK.

17. In a gallon of glue size (as above) put 3-4 pound powdered burnt umber. Lighten with yellow (chrome or ochre), if need be. Hot.

ROSEWOOD.

18. Same as mahoghany, omitting the yellow, and using 3-4 pound venetian red (or more), instead of 1-2 pound. Give one coat of this and then add lampblack, one pinch, or more, to the color; with the latter put in the figure or dark parts of the rosewood.

WALNUT.

19. As oak, with no yellow.

All these colors should be applied hot with a sponge or rag—the superfluous color immediately wiped off. When dry, the surface should be *very* lightly rubbed with boiled oil, and turpentine. After this it may be finished in any manner desired. The colors and their mixing must be left very much to the judgment and experience of the workman, and as on all other occasions of darkening or staining, a bit of the wood to be operated upon should be tried first to ascertain the effect.

FRENCH POLISH STAINS.

20. Small work is often colored simply by mixing French Polish with the desired pigment, and finishing with it, as intimated in the final paragraph on Bleaching. The effect of this is generally good in any color but white. For colors we may use vegetable black or drop black, vermillion, Dragon's Blood, (a gum), ultramarine, soluble blue, Brunswick Green, chromate of lead, (yellow), bichromate of lead (orange), burnt umber, &c., in quantities suitable to produce the effect. The polish is applied in the manner that will be pointed out in our chapter on French Polishing.

WATER AND ALCOHOLIC STAINS.

The stains generally relied upon are really dyes or inks, made by boiling certain coloring matters in water, or dissolving them in water or alcohol. They are best applied hot, and the effects watched. If the first result, after dying, is too weak, repeat the application, and so on, until the proper result is accomplished, always bearing in mind to try a smooth stout chip of the wood first.

When the wood to be stained is spongy or cross-grained, a thin layer of shellac varnish should be put on, and when dry removed by sand-papering. Fine work, slightly oiled and slightly rubbed with fine sand-paper, takes the stain more uniformly and smoothly. If a flat hog-hair tool is used for applying the stain, passing a badger-hair softener, gently and lightly over it when applied, it will improve its effect.

A preparatory wash with a solution of caustic soda, should also be given—and nicely dried out before applying the stain (see Dyeing). For the purpose of fixing or intensifying the colors, an assistant solution called a MORDANT is used in staining or dyeing woods. This is a solution of tin made in various ways—the easiest and neatest being the first method named below.

TIN SOLUTION. (FOR RED COLORS ONLY).

21. Dissolve half a pound of *tin crystals* (chloride of tin) in a pint of water and keep for use. A drop or two is sufficient for an ordinary small job. Another way of making the tin solution: slowly drop into 1 ounce of ordinary nitric acid, half a teaspoonful of muriatic acid, and then put into the mixture as much grain tin or scrapings of pure tin (either scraped from a bar of tin or bought of a druggist who sells dye-stuffs, or from a dealer in watchmaker's materials), as it will dissolve. When the tin is dissolved add 2 ounces of water, or mix the whole at once and put away in a bottle tightly corked. It will be ready for use in two or three days; another form is nitric acid 8 parts, salammoniac 1 part, and tin 1 part. When the tin is dissolved, add 2 parts water.

One more form may be added: Nitric acid, 8 ounces; common salt, 1 ounce; tin (pure), 1 ounce.

22. For blue colors there is used as a mordant either alum, acetate of alumina or liquor of ammonia, to which a little sulphate of iron is added.

Alum is merely dissolved and used in that state, sometimes previous to the application of the dye and sometimes in the stain. Alum solution also works very well as a mordant for red stains made of Brazil wood. Acetate of alumina is made by adding a solution of alum 4 parts in enough warm water to dissolve it, to 3 parts sugar of lead, similarly, dissolved. The liquor ammonia may be purchased directly of the druggist, and one oz. sulphate of iron (green copperas) added to every 12 ounces of the liquor for a mordant. Or, it may be home-made by slacking a 1-2 pound of good lime in a quart of water, adding 4 ounces sal ammoniac, and 1 ounce sulphate of iron, and then allowing the whole to settle in a warm situation.

23. Iron solution. This consists of sulphate of iron (green copperas) dissolved in hot water. The quantity is regulated by what the water will dissolve without a sediment. It is used in combination with gall nuts and logwood in the production of a black color. Another and very effective "iron solution" may be made of clean iron filings put into vinegar, placed in a warm position, and occasionally shaken. This produces an "iron liquor" which can be made stronger or weaker by the addition of more vinegar, and is used like the solution first described.

RED.

24. One pound Brazil wood *in fine chips*; 1 gallon of water, 1 ounce pearl ash. Boil 3 hours, and paint the work with it. Then immediately apply a solution of 2 ounces alum in 1 quart hot water.

25. The same as above adding 10 drops of tin solution (No. 21) to the second mixture.

26. A solution of archil in hot water, allowed to grow cold, and then applied, gives a good color for cheap work. The color is not very durable unless covered with French Polish or varnish. Definite quantities can

hardly be given for archil—it varies in strength, and the workman must depend upon his eye and experiment with a spare piece of wood for a knowledge of effects.

We have spoken of using it cold. This is only for cheap work. For a better color it should be used hot. Archil may be made to produce almost any color between scarlet and purple. The solution of tin (21) turns the color more toward scarlet. Milk of lime, or potash lye, darkens it. By brushing over the work first with the tin solution and then a weak solution of potash, and finally putting on the archil stain, a handsome crimson is produced.

27. A handsome red can also be obtained by the use of the aniline red (fuchsine) in alcohol. The quantity cannot be definitely given, as every different piece of wood will give a different result. Very little experiment, however, will show the quantity needed. Toys, broom handles, &c., are colored with this, as it is quickly prepared—and a little color goes a great way. But this color fades in the *light*.

28. Two ounces extract logwood (or 1 pound logwood boiled in 4 quarts of water for 2 hours) and ten drops of tin solution added.

29. Quarter pound Brazil wood, 1 quart whiskey (hot), for cheap stains of pine tables, &c.

DEEP COCHINEAL RED AND SCARLET.

30. Boil 4 ounces Cochineal in 1 quart of water 3 hours. Brush the liquid upon the wood hot. Give a second coat as soon as the first is dry, and immediately thereafter apply a liquid composed of 1 ounce tartaric acid, 2 ounces tin solution, 1 quart water.

31. The same as 30 for a bright scarlet, but the proportion of cochineal is made one-half of the above.

32. A quick and good but somewhat expensive red, is obtained from carmine 1 ounce, liquor ammoniac 2 ounces, and 1 quart water.

ROSE COLOR.

33. One quarter ounce coralline (an aniline color) dissolved in boiling water, 2 quarts, to which add 1-8

ounce of caustic soda, and 1-2 of the volume of the whole by measure of silicate of soda. Regulate the depth of the color by increasing or diminishing the coralline.

The intensity of the scarlet may be increased by boiling with the other ingredients 3 ounces oak bark.

YELLOW.

34. *Light yellow* for backs and shelves of libraries, desks, &c., where it is considered desirable, to give the soft white wood usually employed, a color. A solution of 1 part turmeric; 30 parts water (hot), is used to give the shade desired. Whisky, instead of water, will do. Turmeric can be made to give quite a red-yellow or orange by increasing the proportion of the dyes. French cabinet makers, to keep the worms out of soft wood shelves, backs of book-cases, and drawers, apply a decoction of wormwood. A weak solution of aloes will serve the purpose of yellowing the wood and of keeping worms out also. The only reason for giving a yellow tone to the wood in such cases is to make it look different from the raw natural wood, but it has probably risen from the original use of an anti-worm wash.

LEMON YELLOW.

35. One-half pound saffron, 1-2 pound French berries, 6 quarts water. Boil 3 hours and add 1-3 ounce tartaric acid, 2-5 ounce alum. Strain and keep in closely corked vessel.

36. One pound barberry root, 5 quarts water. Boil in tin or earthenware (not iron) two hours, and add 1 ounce alum.

37. One part aniline yellow, 30 parts alcohol. By the addition of fuchsine or coralline any desired depth may be given to this yellow color. Aniline colors go very far, but fade easily in the light, even under varnish.

38. One ounce picric acid; 1-2 ounce ammonia liquor; 2 quarts water.

39. One part sugar of lead; 10 parts water. Brush over the wood with this solution, and then give it a coat

of the following: 1 part bi-chromate potash; 20 parts water.

40. One part yellow chromate of potash; 100 parts water, hot.

41. One pound Persian berries; one gallon water. Boil three hours. Apply hot, and afterwards tin solution, 10 drops in 1-2 pint of water.

GREEN.

42. Four ounces of Verdigris; 1-2 ounce sap green; 1-2 ounce Indigo; 3 pints vinegar (wine or cider vinegar). Heat to the boiling point. Apply hot. Sap green may be left out, unless absolutely needed to make the shade of color required. It is apt to fade or turn brown.

43. Obtaining first a blue (which see), and then a yellow upon it produces a fair green if carefully done.

44. One part verdigris, 1 sulphate of iron, powdered, 4 parts wine vinegar, 24 parts water. Boil the whole for three hours.

45. One part salammoniac, 3 parts verdigris, 6 parts good vinegar. Rub it up in a mortar, add 10 to 15 parts good wine or cider vinegar, or whisky. Allow it to remain in a warm place three or four days, when it will be ready to use.

46. One part aniline green, 10 to 12 parts alcohol. Gives almost any shade of bright green desired, and is the handiest of all to use.

BLUE.

47. One pound sulphuric acid, 1-4 pound best indigo, Pound the indigo tolerably fine and put *gradually* into a clean glass jar with the acid, so as to avoid accident. The jar should be large enough to contain twice the quantity actually put into it. Keep this *soluble indigo* on hand; when wanted, use diluted with from 3 to 6 times its bulk of water. It is the best, but does not always give the color required. Indigo blue looks a little unnatural in wood.

48. Brush over the work with a solution of half rain or spring water, filtered, and half the liquor ammoniac mordant spoken of previously (22), then rinse off with

clean water, then paint it over with a decoction of logwood 1 pound boiled in 8 quarts of water two hours.

49. Use for a mordant the *acetate of alumina*, (22) which first paint over the wood and follow it with a wash of *logwood decoction and made as (48.)

50. Boil one pound of logwood in a pint of liquor ammonia with 1-4 ounce of sulphate of iron and two quarts of water. Increase the logwood if not dark enough. Add water if too dark. Every shade of blue can be thus made. Apply hot.

51. In any quantity of nitric acid dissolve pure copper, purchasable at painters' supply houses, or dealers in watchmakers' materials, as much as the acid will take without precipitation. Brush over the work with this. Then follow by brushing over the work with a solution composed of water, 1 pint; and pearlash, 2 ounces.

52. One part sugar of lead, 4 parts of alum. Dissolve separately in water and then mix. Add 1-2 ounce carbonate of soda. Allow it to stand 10 hours, and pour off the clear part. Use it in combination with the following: 1 ounce indigo carmine, 2 quarts water. Brush over the work with the sugar of lead and alum-water first, then with the indigo carmine fluid. The sugar of lead and alum-water should show a density by Baume's Hydrometer of one degree.

53. Analine blue mixes easily with alcohol or water, and any shade can be given with it. Like all the others, it is a very fugitive color.

PURPLE AND VIOLET.

54. One pound of logwood, ¼ pound Brazil wood, 1-2 gallon of water. Boil three hours and apply hot. After which apply solution made by dissolving 6 ounces pearlash, 2 ounces alum, in 1-2 gallon of water. Repeat until the proper color is obtained. Dilute the mixtures if only a VIOLET is wanted.

55. The same as above, omitting the Brazil wood, which gives a red shade.

56. One pound of logwood, 1-2 gallon of water, 10

*The extract of logwood, which is much more convenient to handle, will answer; 3 ounces extract are about as strong as one pound of the chips.

drops tin solution (21). Then give a coat of the indigo blue (47).

57. One part analine violet, 25 parts alcohol. Expensive and fugitive, but very bright and unnatural. This is generally applied after a good sponging off with strong, soapy water (white Castile soap is preferred, because of its freedom from iron), or a solution made of 1 ounce dried soda, 1 ounce olive oil, 3 pints of water, which mixture is boiled until it results in a strong, soapy fluid.

58. A strong extract of archil mixed with indigo (47) will give a purple or violet, as may be desired, according to the strength of the mixture.

LILAC.

59. Archil tolerably strong will produce a fair lilac.

BROWN.

60. One ounce sulphate of magnesia, 1 ounce permanganate of potash, hot water to shade required.

61. Any of the blacks, diluted (see Black); or coffee, tobacco water, &c., (see Darkeners.)

62. One ounce catechu, 1 quart water (hot); brush this over the work, and follow with 1 ounce bi-chromate of potash in 1 quart of water. By varying the proportions of catechu or bi-chromate the shades may be deepened or lightened.

63. One ounce fustic, 1 quart of water; boil and wash the wood; follow with (if not dark enough) 1 ounce sulphate of iron in 1 quart of water.

SILVER GRAY.

64. This is an imperfect black, and may be obtained by simply washing the wood with a solution of 1 1-2 ounces sulphate iron, copperas, or green vitriol; 2 quarts of water; this, with the tannin in the wood will generally make the color decided enough. If it does not, follow with a weak solution of gall nuts 1 ounce, in a quart of water, or of logwood and gall nuts, each one ounce, in 2 quarts of water. Usually, all the desired effect can be obtained by the first of these.

BLACK.

65. One pound logwood, 2 quarts of water. Boil three hours, or use 3 ounces extract of logwood, with same quantity of water. Apply hot. When dry, brush over with hot solution made of 2 ounces sulphate of iron, 1 quart of water. Repeat, if not black enough, as soon as dry.

66. The same as No. 65, except adding 1 ounce gall-nuts (powder) to the second solution.

67. One pound logwood, 2 ounces pearlash; 4 quarts of water. Boil as before, and apply hot, as a second coat; and as a third coat apply a solution of 1 ounce verdigris (acetate of copper), 1 ounce copperas (sulphate of iron), in a quart of boiling vinegar. This gives a rich black—but there is no reason to suppose that this elaborate process gives any better color than No. 65.

68. One pound logwood extract; 5 quarts water. Tie the extract into a muslin rag, and boil two hours in the water. Then take out the rag and color, and add to the mixture 1-2 an ounce of common washing soda (the carbonate), roasted on a shovel. Crush it and dissolve it in the dye. Brush this over the wood with sponge or otherwise, as usual, hot. Allow it to dry, and then go over the work with a solution of 1 ounce bi-chromate of potash; 1 pint of hot water. Apply hot. The effect of the first mixture is a reddish brown; of the last a blue-black. If desirable, the *blue* appearance is increased by lessening the quantity of bi-chromate. When the wood becomes dry, after the last application, it sometimes gets a dusty or flowery look on the surface. This disappears on being rubbed off with a little linseed oil, or wax finish.

69. Any of the inks will answer for quite small jobs —and it is cheaper to use them than to make the above preparations—though it would be expensive on a larger scale—a very moderate-sized piece of soft wood having a capacity for absorption, quite surprising to those unacquainted with the subject. Most inks in use are combinations of gall nuts and sulphate of iron— or of logwood, gall nuts, sulphate of iron and bi-chromate of

potash. The small amount of gum arabic which they generally contain is no hindrance to their coloring.

70. One part aniline black, 20 parts alcohol.

71. Where conveniently accessible, walnut shells in combination with logwood or its extract, will make a cheap black stain. To avail yourself of them, take: 1 pound logwood or 3 ounces extract, 1 pound walnut hulls, 4 quarts water, boil 2 hours, add a pint of strong cider vinegar and 1 ounce sulphate of iron, and boil for another hour and apply hot to the wood. Repeat if not dark enough the first time.

72. 1 ounce logwood extract, 1 dram yellow chromate of potash, 1 quart water (boiling), make a *purple* black. Nitrate of iron is used by some in preference to the sulphate. We know of no reason for the preference, but the reader may discover one. The same proportion is used.

DYEING.

Dyeing veneers is not so much for the purpose of coloring them throughout, as it is for coloring them before they are placed in or on the work, as it is both easier and cheaper to perform the work in a vat and in quanties than to stain each piece as required.

For this purpose veneers are first soaked in a solution of the following proportions: 1 pound chloride of lime, 2 ounces of soda and 1 gallon of water. Twenty-four hours' soaking in this liquid will extract any resinous peculiarities which so resist the entrance of the dye, and will make the wood soft and leathery, and very receptive of the color. Any of the preceding stains will answer, though it is obvious that, on a large scale, economy is a point that must not be overlooked. The vessels used for dyeing should be zinc, copper, brass—except in dyeing black, when the vessel may be iron.

In the following recipes for dyeing, we go over much the same ground, as to means and proportions, as in STAINING; but as there are some points included, also, we will not oblige the workman to turn back, but give some recipes in full.

BLACK.

73. Make a solution of copperas (sulphate of iron) by dissolving it in sufficient hot water to cover the veneers; put in as much copperas as the water will take without precipitation; when there is enough copperas in you will begin to see it fall to the bottom as a dirty brown rust or oxide of iron. Soak the veneers in this solution twenty-four hours, then remove them to a bath made by boiling 1 pound of logwood or its equivalent in the extract (49), for 3 hours in 1 gallon of water. Let it remain an equal length of time; remove and dry. In French workshops they give in addition a soaking for 12 hours in the solution of nitrate of iron—about 8 ounces to the gallon of water.

The following, 74 and 75, are variations of this formula, but we will add them, as they will sometimes be found useful.

FINE BLACK.

74. Put 6 pounds of chip logwood into the copper, with as many veneers as it will conveniently hold, without pressing too tight; fill it with water and boil slowly for about three hours; then add 1-2 pound of powdered verdigris, 1-2 pound of copperas, and 4 ounces of bruised nut-galls; fill the copper up with boiling vinegar as the water evaporates; let it boil gently two hours each day till the wood is dyed through.

75. Procure some liquor from a tanner's pit, or make a strong decoction of oak bark, and to every gallon of the liquor add 1-2 pound of green copperas, and mix them well together; put the liquor into the copper, and make it quite hot, but not to boil; immerse the veneers in it and let them remain for an hour; take them out, and expose them to the air till it has penetrated its substance; then add some logwood to the solution, place again in it, and let it simmer for two or three hours; let the whole cool gradually, dry the veneers in the shade.

BROWN.

76. Eight ounces bichromate potash, 2 gallons hot water; leave the veneers 24 hours, and remove to a bath

made with 8 ounces catechu or fustic, 2 gallons **water**; leave the veneers 24 hours and remove.

BRIGHT RED.

77. To 2 pounds of genuine Brazil dust add 4 gallons of water; put in as many veneers as the liquor will cover; boil them for 3 hours; then add 2 ounces of alum and 2 ounces of nitric acid, and keep it lukewarm until it has struck through.

78. To every pound of logwood chips add 2 gallons of water; put in the veneers, and boil as in the last; then add a sufficient quantity of the tin solution; keep the whole warm till the color has sufficiently penetrated. The logwood chips should be picked from all foreign substances, with which it generally abounds, as bark and dirt; it is always best when fresh cut, which may be known by its appearing of a bright-red color; if stale it will look brown, and will not yield so much coloring matter.

79. A vermilion red can be obtained by first dyeing a black, and then soaking the veneers in a solution of oxalic acid, strong and hot, 8 ounces to the gallon of water. The oxalic acid neutralizes the oxide of iron, and leaves the logwood color. But this is a round-about way and not certain—though in experienced hands the effect is quite good.

The *aniline* colors are cheap, as a little color goes a great way—though the color is not a natural one.

The French method in the use of these is after the preparatory soaking in the caustic soda solution, to give the veneer a dip into a weak solution of sulphuric acid, as a bleacher—drying it, then dipping it into a solution of white castile soap and allowing it to remain a few moments therein. Any of the aniline reds desired may be used for the appropriate color. An ounce of soap to a quart of water is the usual proportion. The ordinary aniline red works well. Care must be taken as to the proportions, which may be about 1 part aniline color to 30 parts water, though it is best to experiment first, as results vary with different woods. The aniline colors do not work so well without the soap bath. Coralline, an-

other aniline color (same proportion as above), gives a good rose color. A little caustic soda and soluble glass are added to produce a good result. The proportions are said to be :—

80. Coraline, 10 ounces ; Caustic soda, 1 ounce ; soluble glass, 2 ounces; hot water, 10 quarts. The color can be deepened by increasing the quantity of coraline.

VIOLET.

A good violet is obtained by soaking the wood in a thin soft soap composed of :—

81. Sweet oil, 1 pint ; caustic soda, 1 pound ; hot water, 1 gallon. Mix water and soda first, then add the oil, immerse the veneer first in this; then in a bath of strong aniline (magenta) red. Another violet is a solution of archil with soluble indigo blue.*

PURPLE.

82. To 2 pounds of chip logwood and 1-2 pound of Brazil dust add 4 gallons of water, and after putting in the veneers boil them for at least three hours; then add 6 ounces of pearlash and two ounces of alum; let them boil for 2 or 3 hours every day, till the color has struck through. The Brazil dust is to make the purple of a red cast; it may, therefore be omitted, if a deep blueish purple is required.

83. Boil 2 pounds of logwood, either in chips or powder, in 4 gallons of water with the veneers; after boiling till the color is well struck in, add by degrees soluble indigo(47), till the purple is of the shade required, which may be known by trying it with a piece of paper; let it then boil for 1 hour, and keep the liquid in a milk-warm state till the color has penetrated the veneer. This method, when properly managed, will produce a brilliant purple not so likely to fade as the foregoing.

*Soluble blue (47) can be bought of supply houses. Ordinary laundry blue, when in balls or lumps, is soluble blue adulterated with starch. This is too weak to use as a dye, but there is a liquid blue which is used for the same purpose, which serves very well as a dye for wood. This liquid laundry blue is by some manufacturers made of soluble indigo, by others of soluble Prussian blue. The indigo is the best.

BLUE.

Aniline blue as before, 1 part to 30 of water after the usual soap bath or dyes made up in the same proportion as stains. See, also, 47, 48 and 49, using the same mordants.

LILAC.

(See Stains).

SILVER GRAY.

84. Expose to the weather in a cast-iron pot of 6 or 8 gallons, old iron nails, hoops, or other scraps, till covered with rust; add 1 gallon of vinegar and two of water; boil all well for an hour; have the veneers ready, which must be air wood, not too dry; put them in the copper used to dye black, and pour the iron liquor over them; add 1 pound of chip logwood, and 2 ounces of bruised nut-galls; then boil up another pot of the iron liquor to supply the copper with, keeping the veneers covered, and boiling 2 hours a day till of the required color.

85. Expose any quantity of old iron in any convenient vessel, and from time to time sprinkle them with spirits of salt, diluted in four times its quantity of water, till they are very thickly covered with rust, then to every 6 pounds add a gallon of water, in which has been dissolved 2 ounces of salts of tartar; lay the veneers in the copper, and cover them with this liquid; let it boil for two or three hours till well soaked, then to every gallon of liquor add 1-4 pound of green copperas, and keep the whole at a moderate temperature till the dye has sufficiently penetrated.

YELLOW.

86. Reduce 4 pounds of the root of barberry, by sawing, to dust, which put in a copper or brass trough; add 4 ounces of tumeric, and 4 gallons of water, then put in as many white holly veneers as the liquor will cover; boil them together for 3 hours, often turning them; when cool add 2 ounces of nitric acid, and the dye will strike through much sooner.

BRIGHT YELLOW.

87. To every gallon of water necessary add 1 pound of French berries; boil the veneers in this till the color has penetrated; add solution of tin 20 grains (see 21) to the infusion of the French berries, and let the veneers remain for 2 or 3 hours, and the color will be very bright.

BRIGHT GREEN.

88. Proceed as in either of the above receipts to produce a yellow; instead of adding nitric acid or the brightening liquid, add as much soluble indigo (47) as will produce the desired color.

89. Dissolve 4 ounces of the best verdigris, and sap-green and indigo 1-2 ounce each, in three pints of the best vinegar; put in the veneers and gently boil till the color has penetrated sufficiently. The hue of the green may be varied by altering the proportion of the ingredients; and unless wanted for a particular purpose, leave out the sap-green, as it is a vegetable color, very apt to change, or turn brown, when exposed to the air.

IMITATIONS.

MAHOGANY.

90. A method used with good effect by many cabinet makers is to brush any moderately hard wood, ash, apple, pear, beech, with nitric acid one part in water ten parts. This is allowed to dry, and followed by a varnish of alcohol one gill, washing soda 3-4 ounces, and dragon's blood 1-4 ounce. The *modus operandi* is that the acid operates as a darkener; and the varnish, which is ready colored by the dragon's blood resin, serves as a glaze.

91. Stain the wood, if light-colored, first with an alcoholic extract of sandal wood, (red sanders,) and when dry give it a slight coat of very thin asphaltum varnish.

92. A good imitation of old mahogany is said to be made by dyeing or staining walnut with a strong alcoholic extract of red sandal or Brazil wood. As the color extracts easily, it can be regulated accordingly. An

ounce of the wood in dust or fine chips to a half pint of alcohol is the usual proportion. The stain should be filtered before using, and applied with sponge or rag.

93. Ordinary red chalk (an oxide of iron and clay), is powdered and rubbed into the wood. It gives a brown mahogany look, and polishes at the same time, and hence is a favorite with turners.

94. Logwood dye, or extract, will make a mahogany color. Darken with alum, or brighten with tin solution. The dark, or figured, portion of the imitation may be made by using a solution of copperas—black stain, or asphaltum thinned with turpentine. Asphaltum should only be used when the job is to be varnished.

95. A good imitation is also obtained by making a decoction of 2 pounds madder; 2 ounces logwood; 1 gallon water. Apply hot, and follow with a wash of pearlash solution—2 drams to a quart of water.

96. Tolerable results—and good ones when the work is small, and can be steeped in the mixture, is to immerse the wood to be colored in a solution of 2 ounces of dragon's blood in 1 quart of turpentine. The gum takes some time to dissolve, and should be prepared in advance, in a bottle which should be frequently shaken.

97. Grind raw sienna in beer, and then add burnt sienna to bring to required color. Apply as a wash ; rub off and finish, as required. Cheap, and looks cheap, except in very skillful hands.

98. On cheap, soft wood a fair mahogany imitation is obtained by the use of the size color (16). This may be given any depth of colored desired, by repetition, two applications being generally enough. When dry, rub off. The color may appear dull, but varnishing will bring it out very well. In towns remote from the seacoast a solution of rosin (common yellow or brown) in borax water can be used for a finish to this size color. It is rubbed on with a sponge or rag, and the superfluous quantity wiped off. Near the coast the salt in the atmosphere keeps this finish sticky, and therefore unfit for use.

99. A crude, quick way to imitate mahogany is the following : 1 ounce Vandyke brown, ¼ pound pearlash, 2 drams dragon's blood, 1 quart boiling water. The

pearlash helps to dissolve the dragon's blood and also aids the color. It is washed upon the wood with a sponge, and when the first coat is dry, some dabs and twists are given with the sponge in imitation of the figure of the grain.

100. Bamboo or cane work can be given a mahogany color by the application of a very hot, concentrated solution of logwood. The work must be quite clean, and the crust should be new, or used only for this purpose. Two coats of spirit varnish should be applied as a finish. Nitric acid, 1 part, to 4 of water, will also color bamboo.

ROSEWOOD.

Imitations of rosewood are made by first graining a red ground. When this is dry put in the figure with a darker stain.

101. Stain the wood first with the logwood, red (28), giving two coats ; then put in the dark figure with a rough brush, sponge, or pounded end of rattan, or any means which you can employ to produce the pattern of rosewood. No directions can be given for the drawing of the figure; the workman must examine the natural wood at all opportunities and endeavor to imitate, and closely scan all grainers' imitations. The grainer avails himself of every aid that art and nature offords to produce his imitations; nothing is too humble for a tool, and no method is for him "unworthy the art." He will work with a bit of chewed stick, an old rag, a worn sponge, a rejected chip of leather, the stub of an old brush—anything for the sake of the effect he desires.

Finish with a glaze of varnish (1 pint) with rose-pink (1-4 pint) in fine powder therein.

102. There is also a very elaborate preparation made with 1 gallon alcohol, 1 1-2 pounds logwood, 1 pound red sanders, 2 ounces aquafortis. Three coats of this are given as a ground. The dark grounds may be given by any of the blacks. By several good workman the following is preferred for the black or figure color :

103. One-half pound gall nuts powdered, 6 quarts water, 1-4 ounce verdigris, 1 ounce logwood extract,

1-4 ounce alum. Boil 3 hours. This is said to look very rich, and when glazed with a very thin asphaltum, dried, sand papered, and finally carefully varnished, to look very rosewoody.

104. Many workmen succeed very well by using a reverse process, namely, staining or dyeing the wood first a black, and then producing a red figure, either by the use of the tin solution (21), or a strong solution, hot, of oxalic acid. Proceed in the same general way as in No. 101.

ROSEWOOD IMITATION ON WALNUT.

105. One pound logwood, 1-2 pound red sanders, 2 quarts water; boil 3 hours. Apply hot, two coats; a strong red is wanted. Make the black figure with thin asphaltum, to which a little lampblack is added. The asphaltum should be mixed in the proportion of 1 pound asphalt to 2 quarts turpentine, a teaspoonful of furniture varnish may also be added with good effect. When varnished this will look very well; this answers also on a light colored hard wood, such as birch. If the glaze needs coloring, add a little extract of red sanders, in alcohol, to it.

ROSEWOOD-COLORED CANE WORK.

106. The following colored varnish is used in cane work: 1 gallon alcohol; 1 pound extract of logwood; 1 pound red sanders; 1 pound dragon's blood; half pound shellac. Shake occasionally. When completely dissolved, strain. Use with brush, giving two or more coats as desired. Finish with one or two coats of ordinary varnish. Suitable for all cane or reed work.

107. Any of the browns (permanganate of potass is very convenient) for the ground color, and a darker brown for the figure. The figure can be put in with a camel hair pencil and softened with a badger blender.

108. A cheap walnut stain for soft-wood chairs, bedsteads, &c., is: one pint nitric acid; 1 pint water; 1 teaspoonfull vinegar and iron, or solution of green vitriol. Apply hot with a new or clean brush upon goods that have been warmed, and kept warm until the color is dried in.

The brush in this case should be protected from the acid by having oil (linseed) applied to the upper part and letting it soak well. The method is to hold the brush-handle down and pour the oil into it. The furniture may be varnished in a little while after staining.

DEEP WALNUT COLOR.

109. *Viedt,* a German authority, gives the following formula, and vouches for its excellence: 1 part Manganate of soda; 1 part epsom salts; 30 parts of hot water. Brush on the wood and allow to dry; repeat if need be. The less water the darker the stain. It admits of any kind of finish.

110. *To color the sap of black walnut.*—To render the color of the sap portion uniform with the darker portion of the wood, a wash is made as follows: One gallon of vinegar, 1 pound of dry burnt umber, 1-2 pound of rose pink, 1-2 pound of Vandyke brown. Grind to a paste, or powder the materials, and mix thoroughly. Apply with a sponge, allow to dry and rub off. The effect is very good, and the color can be graded to match exactly.

111. *Cheap and quick color for soft wood backs, inside of case work, cheap chairs, &c.*—Thin shellac, 1 gallon; dry burnt umber, 1 pound, (powdered); dry burnt sienna, 1 pound; lamp black, 1-4 pound. Mix thoroughly and apply with a brush—an even coat like any other varnish. Rub off with fine paper when dry, and give one coat shellac varnish as a finish.

112. *For soft wood, (cheap) and for same purpose as last.*—Two quarts turpentine, 2 ounces asphaltum, 1 pint Japan varnish, 1 pound burnt umber, 1 pound venetian red (powdered.) Mix thoroughly and apply with brush as ordinary paint. Finish with shellac varnish, and one or more coats of finishing varnish.

113. 1 gallon turpentine, 2 pounds burnt umber, (dry and powdered.) Mix thoroughly. Apply with brush. Rub off, when finished, with woolen cloth, and finish with raw linseed oil.

114. *With wax.*—For soft woods, 1-4 pound asphaltum, 1-2 pound beeswax, 1 gallon turpentine. Keep in

warm place, shake occasionally until thoroughly mixed. Add beeswax if required thicker, and asphaltum if desired darker. Apply with brush or sponge, and rub off with woolen cloth. No varnish. It gives a wax finish.

115. The following is cheap and effective: Walnut-shell extract 1 part—by weight—is dissolved in soft water 6 parts, and slowly heated to boiling until the solution is complete. The surface to be stained is cleaned and warmed, and gone over with the solution once or twice. When the latter is half dry, the whole is gone over again with 1 part of chromate of potash boiled in 5 parts of water. It is then dried, rubbed down, and polished in the ordinary way.

OAK.

116. *Ash* darkened makes a good imitation of oak. Beech, or any other light-colored hard wood, may be stained with any of the browns of the proper shade 59–62) and a graining comb drawn through to get the characteristic grain of the oak. Allow it to dry and put in the lights with a solution of pearl white (bismuth white) and an ounce of isinglass to 1-2 pint of boiling water. Mix thoroughly and apply with brush or any means that will give the effect.

SATIN WOOD.

This is merely a light shade of yellow, and may be obtained by any of the yellow stains previously noted. A favorite recipe is as follows:

117. 1 quart alcohol; 3 ounces turmeric, powdered; 1 1-2 ounces gamboge. Steep for a day; shake up and stain; apply one or more coats; allow to dry, and sandpaper down. May be finished in French polish or varnish.

CHERRY.

A mahogany stain, slightly diluted. The following is recommended by some mechanics:

118. 1 quart spirits turpentine, 1 pint japan, 1 pound dry burnt sienna; apply with brush and wipe off with rags.

119. 3 quarts soft water, 4 ounces annotto, 1-2 ounce hot or pearlash; boil. May be used cold, but is best hot.

A cheap imitation of cherry, and quite good, is by making a decoction of Brazil wood in common whisky, hot, and applying hot.

Sycamore wood, dyed by an infusion of Brazil wood, either by itself or with madder, is made like light-colored mahogany; if alumed before the Brazil is applied, and finished with a wash of verdigris, it resembles pomegranate wood; if, after being dyed with Brazil wood, it is washed over with spirit of vitriol, it resembles coral wood.

Sycamore, dyed with the nankeen dye, that is to say, annatto and sub-carbonate of potasse, imitates light-red mahogany; if dyed with gamboge, dissolved in spirit of turpentine, it imitates citron wood; if dyed with an infusion of madder, and the dyed wood washed over with a solution of sugar of lead, it becomes a veined brown wood; but if the second wash is given with spirits of vitriol, it becomes a veined green wood.

Sycamore, dyed with logwood alone, imitates brown mahogany; but if the logwood dye was very strong, and the wood is afterwards washed over with a solution of verdigris, the wood becomes quite black.

Maple wood, dyed with Brazil, imitates light colored mahogany;—with tumeric it imitates yellow wood; with logwood brown mahogany; with logwood, and then washed with spirit of vitriol, coral wood; with logwood, the wood being previously alumed, it becomes brown; with logwood, and then washed with verdigris, it becomes black.

Poplar wood, dyed with Brazil wood and madder, imitates dark mahogany.

Chestnut wood, dyed with saffron, or old chestnut, dyed with gambooge, imitates dark mahogany.

Beech wood, dyed with tumeric, becomes yellow; with madder, and then washed with spirit of vitriol, it becomes green with veins; and being first alumed and then dyed with logwood, it becomes brown.

Aspen wood, dyed with tumeric, becomes yellow; with alum first, and then logwood, brown; with a strong dye of logwood, and then washed with verdigris, black.

Limetree wood, dyed with tumeric and muriate of tin, becomes orange-colored; with madder, and then washed over with sugar of lead, brown with veins; with a strong bath of logwood, and then washed with verdigris, black.

Peartree wood, dyed with gamboge or saffron, becomes a deep orange satin wood.

Planetree wood, by the same means, also imitates coral wood; that is to say, the wood of the courbarel; dyed with madder alone, it imitates lignumvitæ; with madder, and then washed with sugar of lead, it becames brown with veins; dyed with madder, and then washed with spirit of vitriol, a veiny green wood; with a strong bath of logwood, and then washed with verdigris, black.

Elm, dyed with gamboge or saffron, imitates lignumvitæ.

When the wood is properly colored, and thoroughly dry, it should be polished with Dutch rushes.—*American Mechanics' Magazine, Vol. II., No.* 32, *Sept.* 10, 1825.

FILLERS.

Fillers are intended to save time; to save labor; to save varnish; and, in some cases, to make a good result possible where scraping and pumice stoning are impossible or very difficult, and, we may add, to hide defects.

They are of many kinds, from thin glue size, linseed oil and whiting, up to scraping varnish—a varnish especially made for a filler. Patent fillers, mainly thin dilutions of shellac or of other resins, in wood alcohol, are many in number, and we believe that most of them in the market give fair results. Besides these, there are special mixtures. Every finisher has his own pet recipes—and he thinks that no others work so well.

The first in order is thin glue, which can be used to advantage where it is desirable to preserve the color of soft light woods by varnishing. Woods so coated with glue, thin, allowed to dry thoroughly, lightly sand-papered with fine paper, and then varnished with thin varnish, will hold its color for a long while. The glue should be without the mixture of whiting, so common. Then there is the mixture of calcined plaster of paris and water, applied in a creamy paste with a rag, and the surplus wiped off as soon as the pores are well filled and before the plaster can set. This is used in Europe as a filler before French polishing—but is not so much used here, probably, because French polishing is less prevalent than varnishing.

After these we have the mixture of linseed oil with starch, rye flour, whiting, paris white or plaster of paris, white lead, calcined magnesia or china clay, with turpentine or benzine, to make it work freely. Paris white is probably the best of all these whites, for it is sufficiently fine, does not set too quick, and fills smoother. When it is desirable to fill work of the second grade—such as most of the walnut, cherry, ash or oak furniture sold, coloring matters are added to agree with the wood—as umber for the walnut, venetian red with a pinch of vermillion for cherry, a very small portion of French yellow for oak, and still less yellow for the ash, &c. These fillers may be varnished, wax or oil finished, dead finished, or French polished.

In some instances there is a prejudice against this method of laying a substratum for the finishing coats on account of its supposed lack of durability, but we do not think the difference between the look of old furniture and of our modern work is due so much to the methods of previous generations as it is to the care which those

methods were pursued. In the days of our fathers, a piece of furniture pointed out for our admiration now was polished while in the white with sand-paper, pumice stone, Dutch rushes, one after the other; was varnished, re-sand-papered, pumice-stoned, re-re-varnished, rotten-stoned, varnished again and again; repeated thin coats being given it, until the finish given it was such as to endure with fair care for several generations. In short, the pains which are now bestowed upon first-class pianos or coach work was that which was then given to the furniture which is used for comparison with the necessarily more quickly made and cheaper furniture of to-day.

In the preceding paragraph it will be noticed that linseed oil is used in filling combinations. Now that oil in drying becomes a species of varnish, and hence it leaves a thin coat of varnish as a *filler*. In the following recipes, however, a certain portion of varnish is added to the filler, both to serve as dryer, and to insure more complete filling of the pores.

FILLER FOR WHITE LIGHT-COLORED WOOD.

120. Six pounds whiting, 3 pounds plaster paris (calc.), 1 quart brown japan varnish, 2 quarts raw linseed oil. Add sufficient turpentine or benzine to make it work freely.

FOR COLORED OR DARK WOOD.

121. The same as above—adding for oak a little yellow, and a trace of burnt sienna; for walnut, a mixture of umber and sienna; venetian red, with a trace of red lead, for cherry. Color should be cautiously used, so as not to obscure the liveliness of the wood.

122. In filling, do not forget that the oil and varnish answers as darkeners. For light-colored woods, no color, or at most a trace of yellow. Boiled oil may be substituted for the raw—in the case of dark wood. If you wish to finish rosewood in this way, black japan may be used instead of brown. A filler that will give universal satisfaction, is one composed of equal parts of boiled oil, japan, and benzine, thickened with the best whiting,

under its various names of silver-white, paris-white, &c., &c., and colored according to the wood upon which it is employed, by the addition of any of the colors spoken of.

All these fillers are applied with rags, brush or sponge, and the surplus rubbed off immediately, and the goods allowed to dry, after which the varnish coats may be applied.

A favorite filler with English workmen in French polish is tallow, free from salt, mixed with plaster of paris, colored to suit the wood, as previously mentioned. If the tallow cannot be purchased clear of salt, it can be boiled half an hour or more, when the salt will drop to the bottom of the water, and the clear tallow will swim. Allow it to cool on the water, and then lift it off. Mix with the aid of heat.

PIANO FINISH.

The highest class of work—such as piano cases and the most costly furniture—is first carefully sand-papered with the finest paper, and this portion of the job is concluded with a piece of old sand-paper. It then is given two or three coats of scraping varnish, each allowed to dry very thoroughly. It is next scraped with the steel scraper until the grain of the wood becomes just visible. It is then lightly sand-papered, and then carefully cleaned off with an old silk handkerchief or otherwise. It then receives from three to five coats of polishing varnish—no coat being applied until the last is perfectly dry and hard. Unless thorough dryness is secured there will arise many troubles for the finisher. The last of these varnish coats being allowed to dry hard, it is next rubbed down with powdered pumice stone and water until all inequalities and brush-marks are rubbed out. It is then sponged and dried well by chamois leather, and allowed to stand for all dampness to evaporate from the surface. Two successive polishing varnish coats are again applied, and again rubbed down as before, preferably with powdered rotten stone and water applied with a rag. Wiped off now with sponge or damp chamois, or both, the luster is brought out with the bare

hand, using the ball of the thumb. When all is done, go over the work with a ball of raw cotton containing a drop of sweet oil; clear the work of oil by wiping with an old silk handkerchief and powdered starch or flour, or with the same just perceptibly moist with alcohol.

Cheap pianos have much less labor put upon them. They receive the usual coating of scraping varnish, about three coats of rubbing or polishing varnish, rubbed down once, and a final coat of flowing varnish, making a material shortening of the labor.

DEAD FINISH.

A dead or *matt* finish—that is, one without brilliancy—is obtained by the use of shellac varnish. Two or three coats are given, a filler being first used if required, each allowed to dry thoroughly, and the last rubbed down with pumice stone and raw linseed oil, or powdered rotten stone and oil. There are two shades of shellac—that is, the natural color and the bleached. The bleached is used where it is desirable to keep the color of the wood in as nearly natural a condition as is possible. The unbleached acts somewhat as a darkener. The dead finish is desirable as a contrast to the polished surface of panels, which are finished either with a coat of flowing varnish, or, more carefully, with polishing varnish ("piano finish").

OIL FINISH.

In some shops, what we call a Dead Finish, or Matt Finish, is known as *Oil Finish*. It is generally combined with a polished or "bright" finish, and frequently with "ebonized (black) lines," moldings or beads, and gilding. In the production of this Oil, Dead or Matt Finish, when in a combination like that mentioned above; all the parts, except those to be ebonized, receive the usual first coat of shellac varnish. Then the black stain is applied carefully to the parts intended to be ebonized in two or more successive coats until the color is deep enough. Then the whole work receives another coat of shellac, the carvings, &c., being cleaned thor-

oughly with rag and powder and stick. The coats being thoroughly dry, the parts intended to be bright are scraped down to the wood, and one or more coats of polishing varnish are given, which are allowed to dry, rubbed down with ground pumice stone and water on a rag, succeeded by powdered rotten stone and water, &c., as described in Piano Finish.

The parts to be dead, matt or oil finished are sand-papered down after the first polishing coat on the bright parts is dry; then carefully cleaned and given two or more successive coats of shellac varnish, or rubbing varnish (a cabinet varnish somewhat cheaper than polishing), which are allowed to dry hard, and then rubbed down with powdered pumice stone and oil, as described in Dead Finish, and carefully cleaned. The gilding, if any, is then done (see Gilding), and finally, the ebonized lines, if even and regular, receive a few touches of the powdered pumice stone and oil, or a few rubs with a piece of old and fine half worn-out sand-paper, and then being cleaned, a coat of flowing varnish.

OIL FINISH (GENUINE).

A real oil finish is given by making a mixture of eight parts linseed oil simmered (not boiled) ten minutes and one part turpentine or benzine, and applying it to the furniture with a rag or brush, and afterwards rubbing off clean with a clean dry rag. This is repeated three or more times. It makes a fair finish, with an egg-shell gloss; but, until aged, requires more attention to keep free from dust than the dead finish accomplished with shellac and pumice. It becomes quite durable, however, and will resist hot water and stand hot dishes.

WAX FINISH.

Modern wax finish is obtained by cutting beeswax in spirits of turpentine in any proportion. (A little excess of turpentine does not hurt, as it readily evaporates in the operation, which is the intention.) This makes a waxy paste, which may be applied to all hard woods, and produces a handsome, semi-glossy surface, not so bright as a varnished surface, nor so dull as a "Dead

Finish." It preserves the wood, brings out the color, and can readily be applied by the owner of the furniture. The paste is rubbed in, the superfluous wax roughly scraped off with a wooden scraper, and then gone over with clean, soft woolen rags until it shines. Some workmen prefer to let the wax dissolve in the turpentine *cold,* as they have a fancy the heat diminishes the polishing effect.

Paraffine and stearin are used in the same way, and are by some workmen colored slightly to harmonize with the wood, the colors being the dry mineral colors in fine powder. In some shops it is the practice to protect the wax coat with a thin coat of French polish, which deepens the gloss and has a very fine effect.

Another of these wax finishes is made by mixing about 3 ounces of tallow, 3-4 ounces wax, and 1 pint turpentine. On oaks, applied in a warm room and finished up with French polish, it produces a greatly admired yellowish "tone," which may be due to a trifle of French yellow in the mixture, but withheld by the workman giving the recipe.

Still another *encaustic,* as these wax-finishes are sometimes called, is a *soft soap,* made by boiling a quarter of a pound of white wax in a ley made of pearlash 1 ounce and water 1 quart. One of the objects, and not the least, of this process is to procure a wax free from the adulterations with which almost all commercial wax is contaminated. This wax soap should be constantly stirred while boiling and until cold. Apply with a paint brush, and rub dry with another soft hat-brush or piece of plush, or some similar article. This wax polish is the pleasantest to the eye of all the finishes that can be applied to wood.

On large, flat surfaces some workmen merely brush on the soft wax, and then go over it quickly with a hot flat-iron. This is similar to the old-fashioned method of wax-finishing coffins, still prevalent in some parts of the country. In this method the wax is directly melted upon a hot flat-iron and dropped on the wood. When the wax is evenly ironed into and all over the wood, the surplus wax is scraped off, another ironing of the surface made, and a final polish given with a cork rubber. The

turpentine wax paste, however, works quicker and just as well.

IMITATION WAX FINISH.

Black walnut, just at present the fashionable wood, is sometimes treated thus to produce a finish less liable to injury from water and other causes than wax. It is given a coat of shellac, which is allowed to dry, and then sand-papered off. It is then given a coat of filler, composed of whiting and plaster of paris mixed with brown japan, oil and benzine, and a little thin shellac varnish, which is rubbed in and wiped off. Two coats of shellac are afterwards given, and rubbed down with pumice stone and oil, as in dead finish. In fact, it is a dead finish, and is only called wax finish to tickle the ear of the buyer.

ONE-COAT VARNISH FINISH.

The work is given a coat of boiled oil and fine whiting or plaster, colored with burnt umber, Venetian red or French yellow dredged on it from a flour-dredger, or through an old piece of crape. This is well rubbed in, and the work cleaned off. A single coat of varnish is applied when the filler is dry, and the effect is good.

POLISHING OR RUBBING VARNISH.

Zanzibar polishing varnish is used to procure the finest brilliancy which the surface is capable of. Previous to applying it on the best work, such as rosewood or mahogany, two coats of shellac varnish should be given, each well sand-papered down with fine paper, then two or three coats of polishing varnish, each being allowed to dry very hard before its successor is applied. The last coat being dried hard, it is then rubbed down with powdered pumice stone and water. Then it is rubbed off with rotten stone and water. Chamois off, or clean with an old silk handkerchief; then with a piece of raw cotton just slightly and evenly oiled with sweet oil rub off the work, so as to get away every grain of the rotten stone. Finally, with an old silk handkerchief just moist with

alcohol go over it lightly to take off the oil. Give it one or two light rubs with the ball of the hand and you will have a "piano polish" on your panels.

FLOWING VARNISH.

"Flow" Varnish is applied either upon work carefully prepared, as in the preceding paragraph, or where it is nct easy to give the final polishing touch with the ball of the hand, as in panels, &c. It is much in favor—for instance, where the panels are varnish-polished and the rest of the work dead-finished. In this case the whole work should receive two coats of shellac varnish. The part intended to be *matt* or dead finished should then be rubbed down with pumice stone and oil (linseed, raw), while the panels intended to be bright should be rubbed down with powdered pumice stone and water. The work is then carefully freed from dust with an old silk handkerchief, and then carried into the varnishing room, which should be free from dust, moisture, and of an even temperature (about 70 deg.) Here the flowing varnish should be laid thinly, evenly, and as quickly as may be, making the brush go only one way and leaving no brush marks. The brush used may be either a fitch or badger flowing brush, and the quicker the work is done the better.

FRENCH POLISH.

French Polish is shellac varnish—either simply shellac in alcohol, or in combination with other gums, the latter in small proportion. (Recipe will be given at the close of this chapter.) Previous to the application of the polish the work is sand-papered as usual, wet with a sponge, dried, re-sand-papered, &c., until a good surface is obtained. It is then filled with any of the following fillers: Tallow free of salt; whiting and water; plaster of paris and water; white lead and water; magnesia and water; or combinations of two or more of these four whites, rubbed on with a sponge and wiped off before drying. The tallow serves best for colored woods, and combinations of the *whites* named with dry-

ing oil will also answer in the same case, and the mixture of the same whites with water for light colored woods.

Shellac varnish itself is often used as a filler, put on roughly and rubbed in across the grain with a sponge, allowed to dry, and pumiced off before polishing. Soft woods may be filled with one or more coats of thin glue water, dried and sand-papered off. Holes are filled with a cement composed of equal parts of beeswax, shellac and common resin, which takes the polish perfectly, and can be colored to match the wood with some of its own sawdust, or a mineral color.

Suppose the work to have been duly sand-papered, the grain raised by successive wettings and dryings, and removed by the repeated sand-paperings, the filling to have been applied, wiped off and dried, and the work again sand-papered or pumiced and wiped clean and dry, it is now ready for *polishing.*

Application.—The mode of application necessary for French polish differs from that of ordinary varnishes, being effected by rubbing it with fine cloth upon the surface of the material to be polished, and using oil and spirits of wine during the process. In applying it to large surfaces use a rubber formed of a flat coil of thick woolen cloth, such as drugget, &c., which may be *torn* off the piece in order that the surface of the rubber, which is made of the torn edge of the cloth, may be soft and pliant, and not hard and stiff, as would be the case were it to be cut off, and therefore be liable to scratch the soft surface of the varnish. This rubber is to be securely bound with thread to prevent it from uncoiling when it is used, and it may vary in its size from one to three inches in diameter and from one to two inches in thickness, according to the extent of the surface to be varnished. The polish is to be applied to the middle of the flat face of the rubber by shaking up the bottle containing it against the rubber; it will absorb a considerable quantity, and will continue to supply it equally and in due proportion to the surface which is undergoing the process of polishing.

The face of the rubber must next be covered by a soft linen cloth doubled, the remainder of the cloth being

gathered together at the back of the rubber to form a handle to hold it by, and the face of the cloth must be moistened with a little raw linseed oil applied upon the finger to the middle of it, and the operation be commenced by quickly and lightly rubbing the surface of the article to be polished in a constant succession of small circular strokes, if a flat surface, but if a molded face a light back and forward stroke without lifting the hand will answer, and the operation must be confined to a space of not more than ten or twelve inches square until such space is finished, when an adjoining one may be commenced and united with the first, and so on until the whole serface is covered. The polish is inclosed by the double fold of cloth, which by absorption becomes merely moistened with it, and the rubbing of each piece must be continued until it becomes nearly dry.

The rubber may, for a second coat, be wetted with polish without the oil, and applied as before. A third coat may also be given in the same manner; then a fourth with a little oil, which must be followed as before, with two others without oil; and thus proceeding until the polish acquires some thickness, which will be after a few repetitions, and depends on the care that has been taken in finishing the surface. Then a little spirits of wine may be applied to the inside of the rubber after wetting it with the polish and being covered with the linen as before; it must be very quickly and uniformly rubbed over every part of the surface; this tends to make it even, and very much conduces to its polish.

The cloth must next be wetted with a little spirits of wine and oil without polish, and the surface being rubbed over, with the precautions last mentioned, until it is nearly dry, the effect of the operation will be seen, and if it be found that it is not complete the process must be continued, with the introduction of spirits of wine in its turn as directed, until the surface becomes uniformly smooth and beautifully polished. The work to be polished should be placed opposite the light in order that the effect of the polishing may be better seen. In this manner a surface from one to eight feet square may be polished, and the process, instead of being limited to the polishing of rich cabinets or other smaller

works, can now be applied to tables and other large pieces of furniture with very great advantages over the common method of polishing with wax, oils, &c. In some cases it is considered preferable to rub the wood over with a little oil applied on a linen cloth before beginning to polish, but the propriety of this method is very much doubted.

When the color of the wood to be polished is dark a harder polish may be made by making the composition of one part of shellac and eight parts of spirits, proceeding as before directed. For work polished by the French polish, the recesses or carved work, or where the surfaces are not liable to wear, or are difficult to be got at with the rubber, a spirit made with benzine and sandarach or mastic and benzine (see recipe at the end of chapter), considerably thicker than that used in the foregoing process, may be applied to those parts with a brush or hairpencil, as is commonly done in other modes of varnishing. French polish is not propor for dining tables, nor for anything where it is liable to be partially exposed to a considerable heat.

The object of this apparently intricate but really simple process is to put upon the wood a film of shellac, which shall dry hard and smooth while in the hands of the workman. All the processes described have a reason, as the reader will perceive when he comes to try it.

There is a mode of filling used by some workmen, which we will mention here. Dip the rubber into the polish; dredge upon it out of a common little pepper-box a few grains of plaster of paris, and cover with a fresh piece of linen. Then proceed with the usual circular motion, and get a good surface. Follow this up after it is dry by using powdered and *sifted* pumice stone in the same way as you did the plaster of paris. You will need very little of either—too much plaster will weaken the color of your polish, and too much pumice stone will cut it away.

Porous walnut may be treated like soft wood: glue-sized, dried, sand-papered, two coats shellac applied across the grain, the work again sand-papered, scraped or pumiced, and then polished as described.

The cover of the rubber should be *old* worn linen,

but clean; cotton is apt to give off shreds of lint, but if well washed before using will answer.

No attempt at scraping, sand-papering or polishing veneered work should be made until the last coat, whatever it may be, is thoroughly dry.

The filling is not necessary on boxwood, good ebony, rosewood, or other fine grained woods.

On any, except the fine grained hard wood, the obtaining of a surface is facilitated by moistening with water, causing the grain to rise, allowing it to dry and then sand-papering it off lightly with fine paper; this is repeated two or more times. We have alluded to this several times.

The filling should not be commenced immediately after the sand-papering of the raw wood. The surface should be allowed a rest of twenty-four hours or more, and should be wiped thoroughly clean.

French polishing should be done in a room warmed to a temperature of not less than 72 to 75 deg.; 75 deg. is better. It should be free of dust. There must be no draughts over the work.

Mahogany, if poor in color, may be colored with red oil (raw linseed oil, in which powdered Brazil wood has been soaked), until it has a pleasant, red tone.

The most difficult part of the work in French polishing is near the edges, where it is not easy to make the circular sweep of the hand tell. This may be finished with a camel's hair brush, and *Glaze* (124) laid on as any other varnish.

Lathe work may be French polished easily by turning the wheel by hand and applying the rubber lightly to the surface. No preliminary filling is needed in this case, as the work can be made very smooth by holding against it its own shavings.

FRENCH POLISH.

123. 1 pint alcohol, 4 ounces shellac, 1-4 ounce benzoin, 1-4 ounce sandarch. Use bleached shellac for light color work.

SLICK.

This is a very rapidly drying, shining spirit varnish, used to finish any piece of work in a hurried way. The usual method of applying it is to give the work one somewhat hasty coat of French polish, and then, when dry, going over with one wipe straight forward and back, in the direction of the grain, with the *Slick*. If done with a light hand and evenly, it gives a quick, good finish, not very durable, nor expected to be so. The same rubber is used as with French polish. Slick is called by the various names of Slake, Finish, Glaze, Telegraph, Lightning, &c., &c. In different shops it is made thus:

124. Mastic, 1 ounce; benzine, 5 ounces; alcohol, 5 gills. Shake well and don't use until well dissolved.

Where it is difficult to work with the rubber, brown hard or white hard varnish is used, applied with a brush, (the flat varnishing brush), or a piece of velvet sponge cut brush-wise. Brown Hard Varnish consists of—

125. Shellac, 4 ounces; rosin, 1 ounce; benzoin, 1 ounce; alcohol, 1 pint.

126. White Hard Varnish.—Bleached shellac, 4 ounces; sandarach, 3 ounces; alcohol, 1 pint.

In many cases, however, shellac is the only gum used, and it appears to answer very well, though indeed the other gums do give considerably more polish to the surface of it.

ENAMELED FURNITURE.

Furniture painted and varnished is called enameled. The method of producing this brilliant finish so called resembles that employed in coach-painting, but the processes are shortened, so much pains not being necessary with ware whose use is in the house. The general outlines of the process are:

First coat—which may be a *filler* (for enameled furniture is always of soft, porous wood), carefully wiped off and left to dry—Sand-papering with fine sand-paper follows, and then a coat of white lead with a little ivory-black in it is given, just enough to produce a lead color. Then putty.

This is allowed to dry thoroughly, when it receives rubbing down with sand-paper or pumice stone and water.

This being dry, the ground color is applied generally quite full and almost flowing. This being thoroughly dry, is rubbed off very lightly with the finest sand-paper, pumice and water, or a handful of curled hair, after which the *glaze* is applied. The glaze is the finishing color coat mixed with varnish. This in many shops constitutes the finish, but in others where the work is more careful a coat of flowing varnish is put on over the glaze when the latter is dry. When this is the case, the *glaze* should also be rubbed with curled hair before varnishing. In more careful work the filler is omitted, and two or even three preliminary coats of lead are given instead of one. Red lead is used with the white in the first and second coat when it does not interfere with the ground color, as it dries hard and rubs well. It is needless to say that the work should be well sand-papered before any painting is done at all.

COLORS.

Bright colors are preferred in this class of furniture—green, blue (ultramarine), olive browns, chocolates, &c. We give a table of tints below, from which the reader can select what he desires. No exact proportions can be given ; the workman must practice on a small portion of his material and observe the effect If a workman is accustomed to handle colors from the same dealer, he should make a table of the proportions which he uses. It will soon save him so much time that he will thank us for the hint.

Colors vary much in their intensity. Transparent colors often require two coats of ground.

Always begin with mixing the lighter color first, and then add the darker, until you have the shade required.

TABLE OF TINTS.

GRAY.—White and lamp black.
BUFF.—White, red, yellow, and a little black.
PEARL.—White, ultramarine blue, and carmine.
ORANGE.—Yellow and red.

VIOLET.—White, ultramarine blue, and carmine,

PURPLE.—Same as above, only in different quantities.

GOLD.—White, stone ochre, and a little burnt umber.

OLIVE.—White, yellow, black and red.

CHESTNUT.—Red, black, and yellow.

FLESH.—Vermilion, white, and yellow.

FAWN.—White, red, yellow, burnt umber.

DRAB.—White, yellow, red, burnt and raw umber.

Do. —Ochre, burnt sienna, black.

Do. —Any variety can be obtained by these colors.

BROWN GREEN.—Chrome green, yellow, black, and red.

PEA GREEN.—Chrome green with white lead.

ROSE TINT.—Carmine and white, or madder lake and white.

COPPER.—Red, chrome, yellow, and black.

LEMON.—Pale chrome and white.

CLARET.—Vermilion and blue.

DOVE COLOR.—White, vermilion, blue, yellow.

PINKS.—White, vermilion, madder lake or carmine.

CREAM.—White and pale yellow ochre.

SALMON.—White, light red, and yellow.

STRAW.—Chrome or yellow ochre and white.

LILAC.—Carmine, blue, and white.

These constitute the principal tints in general use, but by practice in composition, a great variety more can be obtained.

GROUND COLORS.

The ground color should always dry *dead* if possible, even though intended to be pumiced or sand-papered. The pumicing or papering is intended to "deaden" the surface of the ground color for the reception of the glaze, as well as to level the surface.

Green.—This may be ground in Japan varnish. Chrome yellow and Prussian blue make a good ground, and can be graded to any shade. It may be glazed with Paris green or green lake. Dark green may be glazed with yellow lake. The last gives a very rich solid effect.

Browns.—Drop black ground in Japan, with a little vermilion added, makes a rich brown. Chrome yellow,

Indian red, burned umber and white lead, cautiously mixed in Japan, beginning with the yellow, which is the principal constituent of this color, will make a good Oxford brown.

Fawn Colors.—Chrome yellow, vermilion (very little), drop black (still less), burned sienna, form the ingredients of many shades.

Drabs.—Vermilion, drop black, chrome yellow and burnt senna will produce your drabs, which you can make warmer or cooler by diminishing or increasing the red.

Clarets.—Vermilion, Prussian blue, white lead. Be careful with the blue. A good purple can also be had in the same way. For fine clarets, mix vermilion, a little ultramarine, rose pink and raw oil, with sugar of lead for drier. It were better if the oil were prepared beforehand as follows:

CLEAR DRYING OIL.

127. One pound litharge, 1 pound sugar lead, half gallon water. Shake frequently, and when the litharge is all dissolved, add another half gallon water, filtering it and putting it into 3 gallons raw linseed oil, with 1 pound litharge stirred into it. Shake frequently, and then allow to stand three or four days. The oil rising to the top, and which may be poured off, constitutes the drying oil. It is clear and bright, and will dry in about twenty-four hours, and is particularly adapted to transparent colors.

When the ground is dry, pumice or sand-paper as usual, and glaze with purple lake.

The claret colors can be obtained any lighter shade by decreasing the blue or omitting it altogether, and glazing with light colored lakes, scarlet or crimson.

The lake colors all work with some difficulty. They work all the better if freshly ground with a little water before being mixed with the varnish.

Blue.—Prussian blue and white lead mixed in the clear drying oil (127) makes a good ground. Glaze with ultramarine. If ultramarine is used for the ground it will take two coats.

White.—White lead for first coat in drying oil **(127)**, sand-paper; second, coat of white lead and oil, sand-paper; third, white lead, oil, and a little varnish, pumice stone; finish with flowing varnish. This is an ordinary white. The oil will in years make it turn yellow somewhat, though by many this yellow tone is not disliked, and some painters put in a little yellow when it is painted; others, to correct the tendency to yellow, and with a view to producing a "cold" white, put in a little ultramarine into the glaze. Tastes differ.

White or China Gloss.—First coat, best French zinc white ground in turpentine, and a few drops of raw oil or the drying oil (127); when dry, sand-paper down; second, another coat of the same, rubbed down when dry; third, apply a coat of zinc white and Damar varnish; fourth, flowing coat of Damar. This will hold its pure white color for a very long time.

Zinc white does not cover as well as white lead, and it may sometimes be necessary to add a thin coat of zinc and turpentine before glazing.

Zinc White or China Gloss—Another Method.—First coat, white lead and turpentine and very little oil (raw or drying oil, (127); then putty; sand-paper or pumice; second, zinc white in drying oil, sand-paper or pumic; third, zinc white with a very little ultramarine, and still less allowance of carmine, in Damar varnish; fourth, one coat of clear Damar varnish. This makes a sweet color, very glossy and durable. The coat of clear Damar may be omitted. The work looks finished when it is glazed.

China Gloss.—(Third method.)—First coat, white lead, a minute portion of ivory black, putty, and when dry rub down.

Second coat, white lead; rub.

Third, zinc white in finishing varnish. Rub down with powdered pumice and water.

Fourth, zinc white in finishing varnish. Rub lightly with curled hair.

Fifth, finishing varnish.

BLACK.

First coat of dark lead color; when dry, a

Second coat of dead black, made of ivory black, drying oil and turpentine. Rub slightly when dry.

Third black body japan varnish (coachmakers'). Very little rubbing will do with this finish. It is used for work-boxes, and the brilliant black parts of furniture where ebonizing is not desired or convenient.

Black (Another Method).—Two coats white lead, each allowed to dry and rubbed down.

Third coat, ivory black and finishing varnish ; rubbed down well.

Fourth, black body japan.

Fifth, finishing varnish, one coat.

A GENERAL METHOD of enamel painting, practiced in some shops :

1. Thin coat lead.
2. Putty, and allow to dry.
3. Rub down.
4. Coat of lead as before, and allow to dry.
5. Rub.
6. Coat of white lead and any mineral color approaching color required. Set by until *tacky* or *nearly* dry.
7. Scrape off with steel scraper, and allow to dry.
8. Rub down.
9. The color proper and varnish or glaze.
10. Dry.
11. Rub off with curled hair and one to three coats of finishing varnish.

ORNAMENTATION.

Enameled work is striped and otherwise ornamented. The striping should be dead color in drying oil, whether it is to be covered with a coat of finishing varnish or it is to lie on the surface of the glazing color.

As to choice of colors, black is a relief to any color - white is the same. Light orange goes well with blue; Black, vermillion, carmine, with green. Black, vermil. lion or orange suits the clarets; with the mixed fawn and drab shades, besides black, the same color sas the ground, only darker by two or three shades, is a good lining.

Indeed, this is true of all colors ; a darker shade of any color makes a good striping for that color; and a lighter color, if striped in a broad line with a thin black one on one side or both, will also look very well. Very vivid effects can be got by running broad black lines with fine orange or vermillion lines at the side, and then splitting the black with a thin white line. But these effects are too brilliant and take too much time for this class of furniture generally.

KNOTS IN THE WOOD.

In cottage or enameled furniture the wood is not always free from knots, which will prevent perfect work in painting, and sometimes bring discredit on the shop. To cover knots, use the following shellac varnish :

120. One pound shellac, 1 gallon alcohol, 4 ounces potash.

A thin coat of this is sufficient to effectually bar the rosin of the knot from interfering with any future operations.

STENCILED WORK.

The popularity of "Eastlake furniture" ornamented with tiles has led to an imitation of it in cheap furniture. It is not very admirable, yet fair effects may be produced with care. The stencils are cut out of strong Manila paper and varnished with thin shellac on both sides. This makes them very durable. The designs are imitations as near as may be of porcelain tiles. The ground should be "dead"—that is, it should be mixed with plenty of turpentine and little oil. When dry, it should be sand-papered slightly with the finest paper. The stenciling will then not run. The stencil colors should be mixed rather thick with boiled oil or japan and a very little turpentine. The stencil brush is of the ordinary shape of stencil brushes—that is, cut off square.

Another method is to give the wood, after the usual sand-papering, a first thin coat of shellac. This, when dry, is sand-papered down with fine sand-paper. This is done so that the stencil color shall not run. The stenciling is then done, and the ground filled in

with a small brush. This method is not so quick nor so neat as the previous one, but is adapted to sunken parts that must be managed slowly and carefully.

Generally speaking, choice tube colors, mixed with japaners' gold size and turpentine, are used in making these imitations of tiles, for the colors on china are pure and bright, though sometimes the ordinary colors produce very good results. A coat of finishing varnish over the stenciled pattern concludes the work and completes the imitation. There is also stenciling on furniture which is not painted, but only French polished or varnished. The process is similar to the first part of the process described in the preceding paragraph; that is, the grain is first filled with thin shellac or French polish, which is allowed to dry, and is then sand-papered. The stenciling follows.

GRAINING.

GROUNDS.

The following will generally answer for the ground colors or coats in most graining operations:

MAHOGANY.

Orange chrome, Venetian red, and white-lead mixed in such proportions as will give the desired tint. Vermilion, raw and burnt sienna, are also employed to modify the shades.

ROSEWOOD.

Vermilion, Venetian red, a little scarlet lake, and white-lead. For ordinary work the scarlet lake may be dispensed with.

BIRD'S-EYE MAPLE AND SATIN WOOD.

White-lead mixed with a little yellow ochre, care being taken not to make the ground of too dark a tint, as the varnish to be afterwards applied will still further darken it. All the colors for these light grounds must be rubbed quite smooth, and be well strained.

DARK OR OLD OAK.

1. Raw sienna, burnt umber, white-lead, and Venetian red. 2. Yellow ochre, Venetian red, and white-lead.

LIGHT OR NEW OAK.

Dark.—Oxford ochre, white-lead and Venetian red, or chrome, yellow ochre, and white-lead.

Light.—Yellow ochre and white-lead ; the desired tint is obtained by the use of more or less of the yellow ochre. The graining or top colors are generally the same as the ground, only darker.

OAK GRAINING IN OIL.

1. Vandyke brown and raw sienna for dark oak, or finely-ground burnt umber and raw sienna for a lighter tint, mixed with equal parts of turpentine and linseed oil. Add patent dryers. Lay this color on thinly and evenly with a large brush ; it does not dry very rapidly.

This is the *top* color, or coat in which the figure or imitation of the markings of the wood are made. Care must be taken not to lay on too much color, or it is liable to have a dirty appearance. Stipple with a dry dusting brush, so as to distribute the color evenly over the work. As in real oak it is invariably found that one side of a slab is coarser than the other, this peculiarity of pattern must be imitated in the combing process. Take a coarse-cut gutta-percha comb, and draw it down one side of the panel, use a finer comb to complete it. This operation produces straight lines of the grain from top to bottom. Next take a fine steel comb, and go over all the previous combing ; in drawing the comb down, give it a short, quick, wavy motion, or move it diagonally across the first lines, thus imitating the pores of the real wood. Cork combs may also be used, and some grainers use a coarse steel comb, with a fold of thin rag placed over the teeth. By a skillful combination of the combs, and a tasteful variation in their use, the different kinds of oak may be most successfully imitated. In graining joints of the various portions of a piece of a work, it must be remembered that in the real wood some

of the grain would necessarily have a perpendicular direction, and another part would run horizontally, and that one part would appear lighter than another, owing to the different angles in which it would receive the rays of light. After combing, the figure, or veining, must be wiped out before the color is dry. Hold several thicknesses of fine rag, or a piece of clean wash-leather over the thumb nail, wipe down a few veins, then move the rag or leather slightly, so as to present a clean surface for the next wipe. A piece of thin gutta-percha, softened in warm water, and pressed to the shape of the thumb, may be used to preserve the nail, but cannot be relied on to remove the color so cleanly as the nail covered with rag or leather; it is useful for common work, as it protects the nail from injury and wear. After having wiped the figures, they must be softened in appearance by still further wiping the grain away from their edges with a small roll of clean rag, so as to imitate the appearance of the wood, where the grain is always darker than the parts next to it. When the oil color is dry it must be overgrained. (See below.)

HAIR-WOOD.

1. First lay on a coat of light gray, of white lead ground in boiled oil, add a little Prussian blue, and mix with turpentine. For ground color use the same paint made much thinner with turpentine, laid on as soon as the first coat is dry. The ground color must only be applied on a small piece at a time, as it must be grained before it dries. For the graining use some of the ground color, to which add a little Prussian blue, apply this with a feather, in long veins. Overgrain with the ground color. 2. Mix white lead and turpentine, and add a little Prussian blue, for the ground color. For the graining color, Prussian blue and raw sienna ground in ale. When the ground is dry, lay on a thin coat of the graining color and soften; put on the long grain with a mottler drawn across the work. Soften, and overgrain in a perpendicular but wavy figure.

ROSEWOOD.

Ground, chrome yellow, vermilion, and white lead,

or as we have described above. (See grounds.) For the graining color grind ivory black and burnt sienna very fine, mix, and lay on, then soften. When dry, put on the top grain in a curly figure, with a small graining brush well filled with ivory black. Shade up the knots with a camel-hair brush, and finish with a glaze of rose-pink.

OVERGRAINING.

This operation is performed in the same manner both upon work which has been oil or spirit grounded in. In overgraining, water colors are used; and, in order to make them adhere to the underlying graining, whether in spirit or in oil, it is necessary to prepare the work to receive them, otherwise they would run off the surface at once. One method is to rub dry powdered whiting quickly over the surface with a soft rag, removing superfluous powder afterwards, and the grainer can at once finish the work. Another plan, which is principally used when a large piece of work is in hand, is to rub a mixture of fullers' earth and water over the graining, and wait until it is perfectly dry before commencing to overgrain. Grind Vandyke brown, or burnt umber in water, and thin with equal proportions of water and table-beer. The color should be a trifle darker than the undergraining; a little practice will teach the tints that are best suited to the various woods to be imitated. The color is applied by a wide hog brush, drawn over the work, generally in the direction of the veins formed by the combing. There are several descriptions of overgraining brushes in use; those most generally employed are thin and flat, with occasional intervals between the tufts of hair. The knots and figures must be lightly touched up with the overgrainer, and the whole gone over quickly with a badger softening brush. The overgraining dries quickly, and the varnish may be then applied, although it is well to wait some hours, so as not to run any risk of removing the graining color. Sometimes a tolerably strong solution of soda with a little burnt sienna is used for the figures, applying the mixture where these are required, and then washing over the work with a sponge and water. Wherever the soda

has been applied, the graining color will be removed. Go over the whole with a wash made of equal parts of table-beer and water, and then overgrain, as above described. As a general rule avoid harsh contrasts between the graining color and the ground. 2. In the mixing of oil graining color it is necessary that the color should work clean and free. Sometimes the color will work stiff and dirty, and in this state will not only produce dirty work, but will occupy thrice the time in rubbing in, compared with color properly mixed. Oil graining color also requires to be megilped—that is, oil color alone will not stand when it is combed ; the marks made with the comb will all run one into the other, and will thus be obliterated. To prevent this running, the color requires to be megilped, so that the comb marks will retain the exact form left by the comb. This is accomplished by the use of beeswax, soft soap, hard soap, lime water, whiting, and pure water. When beeswax is used, the best means of dissolving it is to cut the wax into thin shavings or shreds ; these are put into a suitable can half filled with pure linseed oil, into which a red-hot poker is plunged, and stirred well. This will dissolve the wax thoroughly, and mix it with the oil.

When the wax is all dissolved, the vessel should be filled with either oil or turpentine, which further dilutes and mixes the wax, and serves also to prevent it from congealing, so that it may mix with the graining color thoroughly. This should be seen to, or else the wax is apt to remain in lumps; and when the color is spread upon the work, for graining, the wax will be spread unequally, and will not dry in parts, so that it is absolutely necessary that the wax should be thoroughly mixed with the graining color to produce good work. If soft soap is used, it should first be thoroughly worked up on a palette or a board with either whiting or patent driers; this breaks up the soap, and amalgamates it with the driers, and it will then mix properly with the graining color. Another method is to break up the soft soap in water to a thick froth or lather; in this state it may be beaten up with water and thoroughly mixed with the oil color. When the lime water is used, about 2 lbs. of slaked lime should be thoroughly mixed in a pint can

full of water, and the lime allowed to settle; a portion of the water may then be added to the graining color, and the two well stirred together until they are thoroughly amalgamated. If whiting is used, it should be ground in oil, and then mixed with the graining color. Pure water will also answer the purpose. The wax is the most effectual, but there are some objections to its use. On the whole, pure water is preferable, for if it is well mixed with the oil color, it megilps it sufficiently to hold the combing until it sets; the water then evaporates and leaves no injurious effects behind, and the projection of the grain is less than it is if any other medium is used. The most useful colors for mixing oak-graining color are raw and burnt Turkey umber, Oxford ochre, Vandyke brown, and burnt sienna. The first three, with the addition of ivory black, are all that is required for mixing any shade of graining color. For light oak or wainscot graining color, mix $\frac{2}{3}$ linseed oil with $\frac{1}{3}$ turpentine; add a little Oxford ochre and raw Turkey umber in sufficient quantity, according to the shade required and amount of stuff mixed. Terebine or liquid driers should be added, the quantities being regulated according to whether the graining color is required to be quick or slow drying. A safe quantity to use, if the liquid drier is of the best quality, is about $\frac{1}{2}$ oz. to a pint of color. This will cause the color to dry in about 7 or 8 hours, but twice the quantity may be used with safety if the color is required to dry very quickly. Sugar of lead ground in oil may be used as a drier for graining colors, but the liquid drier is better. After adding the liquid driers, beat or stir well up together; add pure rain water in the proportion of $\frac{1}{2}$ pint of water to 3 pints of oil and turps; beat or stir up until the whole is thoroughly mixed together, after which strain through a fine strainer or a double fold of fine muslin. The color should be thinned until it works freely and lays on well, so that when the color is being brushed over the work to be grained, it will lay on evenly, and be easily spread, and will look clean and of one uniform shade of color. Care and cleanliness of working are necessary to the successful carrying out of this work; and it is essential that the

color, the brushes, and all working tools should be clean to begin with, and be kept clean.

OAK IN SPIRIT COLOR.

This is less durable than oak graining in oil, and is not therefore so much used for outside work, but it does not require so long a time in its working, as it dries rapidly. For the graining color rub up whiting in turpentine, add enough burnt umber and raw sienna, dilute with turps, a little boiled oil, and gold size. Strain carefully, and it is ready for use. In laying this on, cover only a small part of the work at a time before combing, as it dries very quickly, and be careful to spread it evenly and thinly over the work. The combs used are made of steel, horn, or leather. After combing the veins and removing any superfluous graining color from corners or small parts of the work, let it stand for a short time. The flower of the wood has next to be imitated, by removing some portions of the graining color with a small veining fitch. The spirit graining color when used for this purpose must have a little turpentine added to it; apply with the fitch where the flower is required, then rub the places quickly with a piece of old flannel, which will remove the graining color and show the light ground underneath. The light veins and half-lights are also obtained by similar means, either removing the graining color or merely smudging it aside over the veins. The overgraining is performed in the manner described for the oak graining in oil.

GRAINING IN DISTEMPER.

This process is now seldom used, although it stands exposure to the sunlight, without fading, for a great length of time. For oak ground, dissolve gum arabic in hot water, and make a mixture of it with whiting, raw sienna, and Vandyke brown ground in beer. Color the work evenly, brush it down with a dry dusting brush, comb while the color remains wet, then let it get quite dry. Put in the veins with a small brush dipped in clean cold water. After a few seconds run a dry soft duster down the work to remove the color from the

veins. Then lay on a thin coat of Turkey umber ground in table-beer or ale, put on with an overgraining brush. If too much gum is put in the color it is likely to crack and blister, while if there is not sufficient the veins will not be clearly marked by the wiping out.

BIRD'S-EYE MAPLE.

1. Graining color—equal parts of raw sienna and burnt umber mixed in ale, of two thicknesses. First lay on an even coat of the thinner mixture, then with a smaller brush put in the darker shades, mottle and soften with a badger-hair brush. The eye is imitated by dabbing the color while still wet with the tops of the fingers. When dry, put on the top grain in the most prominent places, and shade the eyes with a little burnt sienna. Some grainers use small brushes called maple eye-dotters, instead of the fingers, for forming the eyes. Various forms of brushes are used for the mottling; some consist of short camel hair closely set, while to give the wavy appearance hog-hair mottlers are used, with long hairs, against which the fingers are pressed as the brush is drawn over the work, causing it to assume a variety of pleasing curves. The lines to imitate the heart of the wood are put in with a small brush, and the outer lines parallel to the heart are formed with the overgraining brush. Overgraining brushes for maple consist of a number of small sable brushes mounted at a little distance from each other in a frame, and resembling a comb in its appearance. 2. Grind equal parts of raw and burnt sienna in a mixture of water and ale. Coat the work evenly with this color, then rub it down with a long piece of buff leather, cut straight at the edge and pressed closely against the work. Proceed for the imitation of the eyes and heart of the wood as before directed. 3. For coarser work grind the raw and burnt sienna with a little of the patent driers, and then with boiled oil. Lay on an even coat, and rub down with a piece of buff leather. Soften, and when dry put on a top grain of burnt umber and raw sienna ground in ale. 4. Burnt umber or Vandyke brown laid on unevenly, darker in some places than others, after the

character of the wood; a coarse sponge does for this purpose very well. When the color is disposed over the surface, it must be softened down with the badger-hair tool, and the knots put in with the end of a hog's-hair fitch, by holding the handle between the thumb and finger, and twisting it round; these knots may be afterwards assisted by a camel-hair pencil. A few small veins are frequently found in maple; these may be wiped off with a piece of wash-leather. When this is dry the second or upper grain may be put on; some of the first color diluted will do for this second grain. To put on this grain use the flat hog's-hair brush, and the hairs combed out to straighten or separate them. As soon as the grain is put on, the softener should be passed lightly across the grain in one direction only; this will make one edge of the grain soft and the other sharp, as it occurs in the wood. After the second grain is dry it may be varnished.

MAHOGANY.

1. Vandyke brown and a little crimson lake ground in ale laid on, allowed to dry and then smoothed, forms the ground. Then lay on a second thicker coat, soften with a badger-hair brush, take out the lights while it is wet, and imitate the feathery appearance of mahogany heart. Soften, and top grain with Vandyke brown laid on with an overgraining brush of flat hog-hair combed into detached tufts. In softening, be careful not to disturb the under color. 2. Grind burnt sienna and Vandyke brown in ale, lay on a coat, mottle with a camel-hair mottler, and soften. When dry, overgrain as above.

SATIN WOOD.

1. Graining color.—Equal parts of raw umber and raw sienna, a little whiting and burnt sienna, all ground in ale. Color evenly, and soften, then mottle and feather same as for mahogany. Soften, and allow to dry; overgrain with the same color. 2 Grind raw sienna and whiting in ale very thin, and color the surface. Soften while wet, and take out the lights with a

mottling brush; when dry, overgrain with the same color applied with a flat brush. For other graining directions see Haney's Painters' Manual.

MARBLING ON WOOD.

VERDE ANTIQUE.

If the work is new, lay on a coat of dark lead oil color. When dry, smooth with glass-paper, and lay on a coat of black paint. When the ground is dry, mix some white lead with water and a little beer. Lay this on in large streaks. Fill up the spaces left with veins of lampblack, finely ground in beer, thus covering the whole surface of the work. While still wet soften with a badger-hair brush, so as to cause the veins to run into one another. On the darkest parts of the work lay dabs of white, carelessly applied, to imitate fossils, and dab over the light parts of the work with the black color for the same purpose. With a thin flat graining brush, or a feather, dipped in the white, form small veins over the black; a few dark blue wavy veins may also be put on. When dry, glaze with a thin coat of raw sienna and Prussian blue, ground in spirit of turpentine and mixed in copal varnish. A little emerald green added here and there hightens the effect.

ORIENTAL VERDE ANTIQUE.

Lay on a ground of black in oil. Mix white lead in oil, thinned with turpentine for the graining color. Lay this on in broad transparent veins of irregular depth of color, and while wet dab it over with a piece of wash-leather in different parts to imitate fossils; then with a small piece of cork, twisted round on the work between the finger and thumb, produce a number of little spiral figures of various sizes and shapes. Cut notches on the top of a feather, dip it in the white, and pass it over the black ground in zigzag and fantastic veins, with occasional sharp angles. Let all the work get quite dry, and then glaze with green, in some parts with Prussian blue, in others with raw sienna, leaving some portions

untouched. When dry, wash with beer, dip a feather into the whiting ground, and draw fine veins. To finish, give a coat of glaze, made of a little Prussian blue and raw sienna, mixed in equal parts of boiled oil and turpentine, leaving some of the white veins unglazed.

JASPER MARBLE.

Mix the ground the same as for mahogany, with red lead, Venetian red, and a little chrome yellow, thinned with equal parts of oil and turpentine; lake or vermilion may be substituted for the Venetian red, if a brilliant tint is desired. While the ground is wet dab on some spots of white, soften with a softening brush, and other colors may be applied in the same manner. When dry, put on the veins with a camel-hair brush.

BLACK AND GOLD MARBLE.

Ground, deep ivory black. Put on veins of white lead, yellow ochre, and burnt and raw sienna, with a camel-hair brush. The spaces between the veins must be glazed over with a thin coat of gray or white, over which pass a few white veins. The veins may also be put on with gold leaf. Another method is to have a yellow ground, streaked with broad ribbons of black, in which fine veins are obtained by drawing a sharp piece of wood along them while wet, so as to expose the yellow beneath.

SIENNA MARBLE.

1. Ground, Oxford ochre and white lead. Use burnt and raw sienna, white, black, and a little lake, for marbling. These colors should be laid on as a transparent glaze, and marked and softened while wet. The colors should be properly softened with a badger brush. 2. Ground, raw sienna or yellow ochre. When dry, mix raw sienna with white lead, have ready also some white paint, put in broad transparent tints of white and yellow, and while wet blend them together with a softener. Mix Venetian red and a little black, and put in some broad veins in the same direction as the patchy tints run; for the darker veins take a mixture of Vene-

tian red, lake, and black, and draw them over the first layer of veins with a feather, in fine threads, running to a center, and in transparent veins in different directions. Mix some Prussian blue and lake, and put in the darkest and finest veins over those before laid on. Put in a few touches of burnt sienna between the fine veins, which are formed into small masses. All the colors should be ground in spirit of turpentine and mixed with sufficient gold size to bind them.

DOVE MARBLE.

Ground, lead color, of which it will be necessary to give two or three coats. If the work is new, let it dry hard, rub it smooth with fine glass-paper after each coat, and do not rub the paint off the sharp edges of the wood. For the marbling, take lead color, such as used for the ground, thin it with turpentine, and rub a light coat over a small part of the work ; and with a whitish color form the small specks or fossil remains. Proceed, piece by piece, till the whole surface is covered, being careful to paint but a small part of the ground at once, so that the colors may have sufficient time to blend together while wet, otherwise the work will appear harsh. Then with a small sash tool, put in faint, broad veins of the thin ground color, and numerous very fine veins over the whole surface of the work, crossing each other in every direction. Then make the color a little lighter by adding white lead, and with a feather pass over the broad veins in the same direction, forming streams of threads. With thin white, and with a camel-hair pencil go partly over the same vein with short thick touches, then with a fine striping pencil. When the work is hard, it should be smoothed with very fine glass-paper before being varnished. The first layer of veins should be very faint, so as to be scarcely perceptible; for, as the lighter shades are put on, the former veins will appear sunk from the surface of the work, which will give a good effect where the work is exposed to close inspection.

BLUE AND GOLD MARBLE.

Ground, a light blue; when dry, take blue with a small piece of white-lead and some Prussian blue, and

dab on in patches, leaving portions of the ground to show between. Blend together with a softener; next put on white veins in every direction, leaving large open spaces to be filled up with a pale yellow or gold paint. Finish with fine white irregular threads.

ITALIAN MARBLE.

Ground, a light buff. For marbling, mix stiff in boiled oil, white-lead, Oxford ochre, and a little vermilion; grind burnt sienna very fine in boiled oil, and put it into another vessel; mix pure white stiff in oil, and keep this also separate. Thin these colors with turpentine, and have a brush for each. Take the buff brush moderately full of color, and dab it on in patches, varying as much as possible; take another brush and fill in the spaces between with sienna. With a softener blend the edges together, making them as soft as possible. Draw a few thin white veins over the work with a hair pencil, run in a few thin lines of sienna, and soften.

BLACK AND WHITE MARBLE.

White ground, and with dark veins, put on with a marbling crayon, and softened while the ground is wet. Or, when the ground is dry, cover it with a thin coat of white-lead, and put the veins in with a camel-hair pencil. Blend while wet.

GRANITE.

1. Gray ground, with white or black spots. 2. Venetian and white for the ground, with white, black, and vermilion spots. The spots are put on in several ways; a sponge may be charged with the marbling color and dabbed on the work, or a common brush may be struck against a stick held at a little distance from the work, so as to throw off blots and spots of color.

PORPHYRY.

1. Ground, purple-brown and rose-pink. Grind vermilion and white-lead separately in turpentine, and add a little gold size to each color to bind it. More turpen-

tine must be added before the color is applied. When the ground is dry, fill a large brush with vermilion, squeeze out nearly all the color by scraping the brush on the edge of the palette knife; hold a rod in the left hand, strike the handle of the brush against it, so as to throw small red spots on to the work till the surface is covered. Make the color lighter by adding white-lead, and use as before. Then with clear thin white throw on very fine spots, and when dry put in a few white veins across the work. This marble may be imitated in distemper in precisely the same manner as in oil. 2. The ground is Venetian red, with a little vermilion and white. For marbling, add a little more white to the ground color, and sprinkle over the first coat. When dry, repeat the splashing with a mixture of Venetian red and vermilion, and then with white in very fine spots. Form opaque white veins across the work, and transparent threads in various directions. This must be done when the work is dry and hard, with a sable pencil, and the threads drawn with a feather. For each separate color use a different brush.

VENEERING.

HOW TO PREPARE THE GROUNDWORK.

The groundwork forms a very important part in veneered work, and if not properly selected and treated, it will go hollow and all sorts of shapes, and will spoil work that may be done excellently in all other parts. Wherever possible, the ground to be veneered upon should be the heart side, as shown in the following cut.

If veneered upon the reverse side, it is certain to go hollow, as the fibers are more easily bent on that side of the wood. All knots and imperfections should be cut out, and pieces of the same kind of wood let-in in their places. But in common work, where economy of time

is a consideration, mix plaster-of-Paris and glue together, and fill up all holes; it will soon set, and when hard, the surface should be made perfectly level with the toothing-plane, For soft porous wood, it is as well to make a thin size with glue and water, and put over it before veneering, letting it dry. On hard close-grained wood this is not required. If endway wood is to be veneered, well glue it, rubbing in with the fingers, so that the wood may absorb as much glue as possible, and veneer when dry.

HOW TO PREPARE VENEERS BEFORE LAYING.

Mahogany Veneer.—This is the easiest to manage, as it requires neither drying nor flattening, but is put on just as it is received. If very badly sawn, it must be toothed, until the saw-marks are nearly out, before laying.

Satin Wood, King Wood, Manilla Wood, Zebra Wood, Ebony, California Laurel and *Snake Wood* should all be treated in the same manner as mahogany.

Bird's-Eye Maple Veneer.—If sawn veneers, they should be well shrunk between hot cauls previous to laying.

Tulip Wood, Purple Wood, Coromandel Wood, and *Yacca Wood* should be treated the same as bird's-eye maple.

Rosewood Veneer.—If new wood, it should be held over a shaving fire, and kept moving quickly until the gum begins to boil out of the pores of the wood; then place between two cauls, and hand-screw down till dry; tooth and veneer. Knife-cut veneers do not require this treatment.

Wainscot or Straight Grained Oak Veneer.—The same as mahogany.

Thuya Wood.—The same as maple.

Pollard or Knotted Oak.—Well shrink between hot cauls, and tooth all to a thickness as nearly as possible, and joint up with a buhl-saw. Place two pieces of veneer together, and follow the figure of the wood with the saw. When the veneer is made to the size required,

place all the pieces as fitted, and fasten them down on board with a few veneer-pins; glue some strips of paper over the joints, and let them remain till dry. If a large top is to be made, it is best done in two or three parts, and jointed together at the last. Where much work of this kind is done, a marqueterie-cutter's "donkey" should be made; this is like a harness-maker's clamp, fixed on the end of a sawing-stool, with a string through the top, and secured to a piece of wood at the bottom of the stool, so that the pressure of the foot is sufficient to grip the veneer for sawing, and is instantly released by raising the foot. After jointing-up as described, take out the veneer-pins, and fill up any little imperfections in the under side with glue and yellow ocher; then lay with a caul.

Plain Walnut Veneers should be treated like mahogany.

Burr Walnut Veneers.—First damp all over with a wet sponge, then cut out the required size for the work; it will cut very easy when damped, and not split. A shoemaker's common cutting-knife is very useful for a veneer knife, and can be bought for a few cents. After cutting out, place between hot cauls, and when cold it will be well flattened and shrunk. Then fill up all holes, and joint together. If the holes should be made round or square, the joint will show; they should be cut an irregular shape, like the figure of the wood. After the pieces are fitted in, glue paper on the back; and when dry, if the joint should not be quite close in any part, just damp the place with the finger before veneering. It is best to lay this sort of wood with a caul where possible, in which case a sheet of paper should be placed all over the veneer before the caul is put on, as the glue will come through every part. Some size the veneer before laying; but this is a waste of time, as, when the caul is removed, the glue will be found to have penetrated the veneer like a sponge. In cleaning off flat work, time is saved by the use of an iron smoothing or panel plane. For shaped work, just damp with a wet rag well rubbed with soap, and it will be found to scrape up as easy as possible.

Amboyna Veneers.—Treat similar to mahogany, but joint up like pollard-oak veneers.

LAYING VENEERS.

The introduction of machinery for the purpose of cutting veneers has been a material saving both in the cost and wear of furniture, while it has enabled the workman to extend to a surface of thousands of feet any fine piece of timber he may meet with, which, before the invention of that machinery, he could not have extended to as many hundreds of feet. The value to which a single log of fine timber is turned by means of the improved machinery—either the knife or saw—is really incredible to those who have not witnessed the operation. When the cabinet-maker has occasion to use veneers, he has only to purchase a log of the wood, which suits his purpose, send it to the mill, and he has it returned cut up to the required thickness in a very short time, and at a trifling expense.

There are many persons unconnected with the trade who are of opinion that solid wood makes the best furniture. This is a great mistake. In most cases, solid wood is used only as a matter of economy, especially in walnut furniture. The solid wood does not cost as much per foot as good veneer, leaving out of the question the cost of the groundwork wood, the glue, and the extra labor in veneering.

Veneer is used by cabinet-makers to give strength and beauty to their work. The most rare and beautiful woods are cut into veneers. The fall of a piano jointed up and veneered on both sides has double the strength of one jointed in plain solid wood without being veneered, to say nothing of its beautiful appearance; so are panels, fretwork, &c. While the cabinet article is kept free from damp, and in such a state that the glue is not dissolved, the covering of beautiful wood does not wear out; and thus, with a vast saving in the more costly material, there is the same durability as if nothing but that material had been used for the whole. There is another advantage in the use of fancy woods on the surface, namely, that the body of the article, in numer-

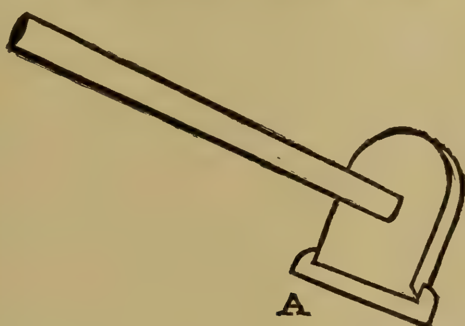
ous pieces of furniture upon which the fancy wood is laid, can be much better put together than if it had formed the external portion. When mahogany was first introduced as a cabinet timber, it was used solid for chairs, tables, &c. When, however, its great value became known—the ease with which it can be worked, the improvement polish or varnish effects in its color, the firmness with which it holds when glued, and the improvement time gives it when properly taken care of —good mahogany was considered far too valuable a timber to be used solid; and it began to be employed as the staple timber for veneering. Other woods, some lighter and others darker, were used for borders and ornaments, but mahogany for the body of the work; and when it came to be so employed, a great revolution was effected in the art of cabinet-making.

Veneering, whether done in mahogany or any other wood, was at first very expensive. The veneers were cut by hand, and were as thick as what we now call bead-stuff; they were also of unequal thickness, the wood being mangled by the operation of cutting, and the finest pieces—those, namely, which are fine figured, cross-grained, or have the fibers across their thickness—were always in danger of being broken.

VENEERING HAMMER, ETC.

We will now describe the different methods of laying veneers, beginning with work laid with the veneering hammer, the best and cheapest form of which is shown below. It can be made of any kind of wood. There is a piece of hoop-iron, an eighth of an inch thick and the edge rounded so that it will slide easy, fitted in the bottom (see A., page 77). Large work, such as a side-board top, if veneered with the hammer, should have the groundwork made rounding on the faced side by well sizing it with thin size, and as the veneer shrinks, it will pull it quite level again in drying. Before commencing to glue, have a couple of warm flat-irons ready in case they are wanted, as very much depends on the temperature where the veneering is to be done. When all is ready, wet a piece of sponge in some size, which is

better than water, and wipe over the outside of the veneer (if a large surface, it is better done in twice); then glue the groundwork with moderately thin glue. When the surface is glued, put the veneer on in its place quickly, and rub the hammer up and down straight, to press all the air out from between; then commence crossway, placing one hand on the end of the hammer, and the other at the extreme end of the handle, with a wriggling motion toward the edge, which follow up quickly till the surface is gone over. If the glue flows freely the veneer is generally down; but if not, it must be wiped over with the sponge again, and the irons used, which will make the glue warm; then use the hammer again, as the glue must be got out. It can be easily ascertained



VENEERING HAMMER.

whether the veneer is down by tapping it over with the end of the veneering-hammer handle; and if a faulty place be found, it must be made all right. Knife-cut veneers in wainscot oak, bird's-eye maple, and all similar light woods, are best laid with the hammer, as they lay very easy, and the glue does not penetrate right through them as it does with a caul; but if a caul be used, the glue should be mixed with flake-white to the consistency of white paint.

The next method of laying veneers is with a caul, which is a much cleaner way than using the hammer. The caul is usually made of wood about an inch thick; it must be larger than the work to be veneered, and it must be planed up true on both sides. Zinc cauls are sometimes used, of about a quarter of an inch substance;

they last longer than wood, and the glue, if any should come through the veneer, does not adhere so firmly to zinc as it does to wood. In English shops a common practice is to soap the caul to prevent glue sticking.

When all is prepared, see that there is a good fire to heat the cauls, and while the caul is getting hot, soak the under side of the groundwork with warm water, and rub it well in with the hand, letting it stand a few minutes; then glue the surface, care being taken to leave no place uncovered with glue, which should not be thick, and let it stand for a time that the steam may evaporate; then lay the veneer on, and fasten in a couple or so of places with a veneer-pin (a piece of wire like half an inch cut off a common pin), or, if veneer-pins are not to be obtained, use fine tacks; then place the caul on and screw down quickly, either in a press or with handscrews.

In large manufactories, where steam-power is used, there is very little difficulty in veneering flat surfaces. The workman is only required to glue his work and fasten the veneer on in its place with a few veneer pins; it is then taken to the press, which is a large iron box with screws and clamps on the top for pressing the work down. The veneer is laid face down on the box, and the screws just brought to a gentle pressure; the steam is turned on inside the box, the heat of which soon causes the glue to flow; the screws are then tightened, and the steam allowed to escape. The metal top will soon cool. and the work can then be removed. This plan is particularly useful for large surfaces such as loo-table tops, or wardrobe ends, which by this process can be done with as much ease as a drawer-front.

Shops which do not possess steam-power frequently use a press consisting of a framework, with the screws, etc., and a thick iron plate heated by a number of gas-jets underneath; when sufficiently heated, the gas is turned off and the plate allowed to cool, when the work can be removed.

The next method is to lay veneers without a caul, as practiced by the cheap-furniture makers. To do this, soak the under side of the groundwork with water, as before described; then rub a piece of common soap on the outside surface of the veneer; then glue and fix the

veneer in its place with a veneer-pin at each corner (the pins are doubled over when driven in sufficient to hold; the holes do not show when taken out, as a tack would); then take two of these veneered pieces of work and heat well before the fire; place both together, face to face, and put in the press or handscrew down. A dozen pieces may be done in the same way with a little help in making them hot; but the pieces should be all of the same size, and placed exactly even when screwed down. Chiffonier ends, small cabinets, panels, &c., are usually done in this way. The glue for this purpose should be thin.

HOW TO VENEER IRREGULAR SURFACES.

When the surface is irregular, it is impossible to have recourse to the caul or hammer; the way to proceed is as follows: Get a piece of very close canvas, the best that can be procured, and make a sort of bag or pillow about an inch and a half or two inches thick, and fill it with dry sand; then put it upon a hot plate, constantly turning it until thoroughly hot through; then glue, and fix the veneer with a veneer-pin or two, and cover it with paper; then place the sand bag on (a flat board on the top of the sand bag), and screw down. The best screws for this purpose are the common handscrews; they are made with a single screw like a small cramp, and can be had in different sizes. A piece of wood should be fitted very near to the hollows, which should be screwed down first.

HOW TO VENEER ROUND OR CIRCULAR WORK.

Make a kind of windlass to turn with a handle; fix the work on a spindle, and have some one to turn. If a straight shaft like a circular washstand, or circular pedestal, is to be veneered, first glue the groundwork, then place on the veneer, and fix with veneer-pins, letting the veneers overlap each other; put a straightedge across, and cut down for the joint with a veneer-knife; then remove the pieces and press the joint up. Care should be taken to have a piece of webbing ready (ordinary chair-web will do), one end of which tack on, and pull mod-

erately tight while the handle is being turned. Keep the edge of the web up close until the veneer is covered; then tack the end down, and damp the webbing over slightly with a wet sponge, which will cause it to pull very tight. Place the work before a good shaving-fire, and keep it turned until warm all round; then let it stand to dry, and the veneer will be found to be down. If a faulty place is discovered after removing the webbing, apply a warm iron to the part, and rub it a little with the veneering-hammer, and it will be all right. No water should be used, and the iron should be only moderately warm. In veneering small columns, etc., the veneer should have thin canvas or calico glued over the face side before laying, otherwise there is a danger of the veneer splitting in the laying.

VENEERING MOLDINGS IN STRAIGHT AND SWEEPWORK.

Veneering moldings has been a special branch in the cabinet and pianoforte trades for some years past. Most difficult moldings are now veneered, which some years ago would not have been attempted, such as a thumb molding with a square and hollow underneath, as used for pianoforte tops. This is laid in one piece, and with the thinnest knife-cut veneer; any other sort would not do. Metal cauls are chiefly used, as they make the edges so much better. Before laying, the groundwork is well coated with glue and color made as near like the wood as possible, because sometimes, in the cleaning up, the workman is apt to go through, and if the groundwork should be the color of the veneer used, it is scarcely seen, especially in dark woods. Previous to laying, the veneer is made a little damp, and the outside well rubbed with soap, which keeps the caul from holding it, allows it to slide into its place without splitting, and in drying prevents its sticking to the caul. The thumb moldings on loo, occasional, card, and kidney shaped table-tops are usually veneered. A frame is made to the different shaped tops, to stand about an inch from the molding, and stout canvas is tacked on the under side of it. The frame is then screwed down on the top. The veneer should be previously jointed, and a piece of strong writ-

ing paper glued on the outside of each joint to hold it together. Glue the work, and fasten the veneer in its place with veneer pins; then draw the canvas from the frame tightly over it, and tack it underneath the top.

It is well not to glue more than a foot or eighteen inches at a time, as the glue soon chills. When all is down, just damp over with a sponge, as it causes the canvas to pull very tight; when dry, the top can be veneered. The square to the molding is formed by cutting off the top veneer with a cutting-gauge, and finished with a square-edged file. Ogee moldings for cornices, etc., can be easily veneered without a caul when properly constructed, as one will lay the other if the following plan is carefully followed: The outside of the veneer should be well rubbed with soap before placing together, to prevent sticking, or a piece of thin paper laid between. When sawn veneers of very fine wood are used, the best plan is to clean up the face side beforehand, and glue over it a piece of very thin canvas or muslin. The glue must be very thin, and the veneer allowed to dry before laying. If this plan is not adopted with fine wood, it is almost certain to split when being forced into its place. The muslin can easily be removed when the veneer is laid, by damping it over with a sponge; after remaining a few minutes it can be stripped off. The workman must use his own judgment about following this plan for all moldings where sawn veneers are used; it must entirely depend upon whether the wood is tough or brittle, but it is always best to err on the safe side. Another plan for small moldings, such as are used for friezes for steamers, small cabinets, etc., is to work a hollow in a piece of inch stuff of two inches and three-quarters wide. A quarter of an inch is marked off on each side, and the hollow worked in the middle to about three-quarters of an inch deep; a piece of stuff is then worked and fitted to the hollow, and both are veneered. One will lay the other. When dry, each one is cut down the center with a circular saw, converting the two into four moldings. This plan is frequently followed in cheap work for cornice moldings.

MARQUETERIE WORK.

Marqueterie consists in representing flowers, animals, landscapes, and other objects in their proper tints, and includes all those geometrical designs to which the specimens of parqueterie or inlaid floors belong. Inlaying with colored woods became very general in England in the latter part of the sixteenth century, the ornament being cut out and filed to the shape, and then let in with chisels, gouges, etc. The same system was pursued until veneers were introduced, which were of moderate thickness, when a fine saw took the place of chisels and gouges. It was then called marqueterie, and was brought into England from the Continent. The old books of design of ornamental inlays for cabinet work, and the London cabinet-maker's price-books for piecework published by the London Society of Cabinet-makers in 1811, do not contain any mention of marqueterie or buhl work; it may be presumed, therefore, that the workmen of that period were not acquainted with these arts to any extent.

The work is supplied to the cabinet-maker from the marqueterie cutter, who makes the cutting of buhl and marqueterie his trade. Cabinet-makers, as a rule, are not expected to do the cutting; but it is well to know something of the methods, it being very easy, and is well paid; but it requires some education beforehand to become expert. A marqueterie cutter who can cut and design his own work must be a good freehand draughtsman, and understand the harmony of color, so as to arrange the different woods with effect. We will first explain the making of colored lines, which is the most simple part of this word. Colored lines are extensively used in fancy cabinet work, and sometimes form the sole ornament. They can be easily arranged, at the will of the designer, to make a variety of designs of geometrical patterns. The principal tool required is a fine circular saw, fitted as described further on. For making single lines of white holly or any other wood where a single veneer is used, or for the making of chess or draught squares in veneer, etc., etc., the saw should be from three to three and a half inches in diameter, and

with a fine dovetail saw-tooth, which will be found to answer the purpose well. First shoot the edge of the veneer, and then cut off with the saw the width required: about three or four-feet lengths will be found the most useful.

We will now give a wider line, say three-eighths in width, and of a pattern much in use. The woods required are black veneer, white holly veneer, and inch or three-quarter tulip-wood. A six or seven-inch saw should be used. Cut the veneer three feet long and six inches wide; take four pieces of white and two of black, and make two gluings, placing the black in the middle; then put both together, with a piece of paper between, and place between hot cauls, and handscrew down till dry. A block of wood should then be made of the angle of 45 degrees, and fixed on the table parallel to the saw, the bottom edge to touch the saw. Take the tulip-wood and cut off one end to the angle given; then place a piece of wood, the thickness of the pieces to be cut off, under the block to set it up; after which, set the fence of the saw to one-eighth, and commence to cut off as many pieces as it will take to cover the veneer. Take the veneers from the cauls, and glue the pieces of tulip-wood across the veneer, pressing each piece up close to a joint, until the surface is covered. Put it by, and when dry, level the top of the tulip-wood and glue the other veneer on; or the tulip-wood can be cut off square—it will make equally as good a line; and when dry, face and slice off in veneers ready for use. In this way the Mosaic bandings are made which are introduced into madiæval work. Of course a block must be made to each separate angle, according to the design, and all the pieces glued in the same manner as previously described, and cut off into veneers with the circular saw, which will be found of the greatest possible service for this kind of work. Rosettes, patras, center-pieces, and bandings are all made in the same manner. It would be as well, perhaps, to remind the workman that the designs should all show plankways; if endway wood is worked into a pattern, it is liable to crumble away in the cleaning off, and so spoil the work.

We now come to the cutting of marqueterie. The

tools required are a buhl-saw and frame: the saws are as fine as a horse-hair, and can be bought at the tool-shops. When the design consists of flowers or scroll-work, some marqueterie cutters take the design off on tracing paper, and glue or paste it on the groundwork veneer, while those less particular about their designs use printed patterns which they can buy, pasting them on the pattern. They are so cheap that their destruction is of no consequence. Others prick holes very close together on every line to be cut, the design being then laid upon the groundwork veneer, and dusted over with a pounce-bag; care should be taken not to let the design slip, or the pattern will be spoiled. The different colored veneers are then temporarily glued at the back of the groundwork where required, and a small hole made with a fine bradawl on one of the lines to be cut, or in any part which is not conspicuous. The work is then placed in a marqueterie clamp or donkey, which is made like a harness-maker's clamp, to tighten by means of a treadle, for hand sawing. There are a multitude of devices for accomplishing this work by machines. These machines are now for sale everywhere and need no special description. They are known under the general name of scroll-saws or bracket-saws, and the saw-blade, being unloosed from its handle, is thrust through the hole. The saw-handle is then fixed, and the material is held loosely by the left hand, and the workman proceeds with his sawing. He then dexterously turns the saw and the material about, so as to make the tortuous cut correspond with the lines of the design. When cutting out, the saw will frequently require to be lubricated with bees-wax; grease must not be used, as it spoils the work. In marqueterie, much depends on skill in using the saw. When the sawing is done, place all the parts together to form the design, and select those to be shaded. Shading is accomplished in the following manner: A box or tray made of sheet-iron is filled with dry clean sand about two inches deep, and placed on the top of the stove; the heat of the sand should be frequently tested by a piece of waste veneer being thrust vertically into the sand; if sufficiently hot, the point deepest in the sand will be found to be dark, and gradually soft-

ened down as it leaves the sand. When the pieces which require shading are finished, all the parts which form the design should be placed together, and a piece of paper glued or pasted over the whole. It is then ready for use.

This kind of work is best laid with a caul, and in cleaning off no paper cork should be used in papering up, as it will wear away the softest wood, and leave the hardest standing up, which will spoil the surface. It is best to use a flat piece of pine for a rubber for all marqueterie, buhl, or inlaid work, and a good surface is then preserved.

IMITATION MARQUETERIE.

These are printed veneers, backed with paper, look very well, and are cheap. The veneer, ready printed, can be purchased. It is paper-backed.

BUHL WORK.

Buhl work consists of various designs similar to marqueterie; but instead of wood, metal is used, or tortoise shell, ivory, brass, silver, or a combination of all these substances. It is cut out and fitted together with a fine saw, in the same manner as marqueterie. When cutting out, it is best to hold the saw a little on the bevel, so as to allow of the piece fitting in and filling up the thickness of the saw-cut, to make a good joint when finished; and marqueterie, where only two colored woods are used, should be done in the same manner; but if there be more thicknesses for different colors, it is best to cut through square, it being difficult to cut on the bevel to fit when there are more than two thicknesses. Buhl work should be laid with a caul. The best glue should be used, and boiled for a week or two, when it will be much stronger than if only just boiled. About a tablespoonful of Venice turpentine to each pint of glue should be added when boiling, keeping it well stirred. This will be found to be one of the best substances for holding wood and metal together. When the veneering is done, it must be cleaned off in the fol-

lowing rather tedious and expensive manner: First go over the surface with a large flat file; then get a piece of pumice-stone, and, after grinding it to a flat face, dip it in linseed oil, and rub over the surface until it is quite level, finishing off with fine-flour emery-paper. The engraver will then engrave the parts required, and the work will be ready for polishing. Employers are very careful to whom they intrust this kind of work, as the materials are very expensive; and unless the workman has had experience and become efficient, he has a difficulty in finding employment in this special branch of the trade.

ORMOLU.

Ormolu is the name given by the French to the moldings and ornaments in "fire-gilt," which are used in connection with buhl and marqueterie furniture. Ormolu proper is a metal composed of fifty-eight per cent. of copper and forty-two of brass. This composition is particularly well adapted to receive "fire-gilding," the ormolu being entirely covered by the gold plating. It also gives a handsome finish to rosewood or ebonized furniture. In order to meet the demand for inexpensive furniture, an imitation of the fire-gilt ornaments is made of lacquered brass metal of the cheapest sort, and is very perishable. The moldings or ornaments are fixed in their positions by brass pins, or fine brass screws, placed so that the heads are not conspicuous. The difference between the imitation and the genuine article is readily perceived.

INLAYING.

The method usually adopted in solid work for the cutting in is as follows: If lines are required, cut them in with a double-tooth cutting-gauge, the cutters set exactly to the width of the line, and then with a router remove the wood to the depth required. When the inlay is of an intricate pattern, place it in its position, and mark round it with a fine marking-awl; then take the veneer-knife, the handle grasped by the left hand, and place the point of it on the line in an upright position, and commence to tap on the back with a hammer, and

at the same time guiding it carefully in the direction intended. When cut round, remove the inside partly out with a chisel, and finish to the depth required with the old-woman's tooth.

In veneered work, the inlaying can be accomplished in much less time. If the work to be inlaid is laid with a caul, the caul should not remain on longer than an hour and a half. If the inlay consists of lines or a geometrical design, cut them in at once, as the glue will soon dry, and if allowed to dry before cutting in, the groundwork will pull out with the veneer, and it will be found impossible to make so good a job of it, besides taking three times as long to do. If the work is laid with a hammer, cut in directly the veneer is down. If a piece of marqueterie is introduced, joint it into the veneer before it is laid, and lay with a caul. Work of this description, exposed to the air before the glue is dry, should have two pieces of sweep-wood screwed on the under side so as to pull the face side rounding, and these must remain on till the glue is dry, otherwise the work will go hollow.

Ivory and mother-of-pearl are also used for inlays in decorative furniture of a less costly description than that previously described. Dressing case makers and papier mache workers also use these extensively, the former for ornaments in the fronts and tops of cases, usually connected with lines of sheet zinc, which material matches with the pearl better than anything else—so well, indeed, that a person unconnected with the trade cannot tell the difference ; they are also used for card cases and fancy articles for the boudoir. Sometimes the form the pearl is desired to assume is of a very delicate character, to resemble carving, and is accomplished in the following manner : The surface of the pearl is covered with a mixture of tallow and wax put on warm, and when cold the design is marked out through the covering of wax ; then strong nitric acid is applied, which will eat away the pearl to the depth required, and the whole is wiped off with a rag. Designs of great delicacy and variety of form are thus obtained, which it would be impossible to secure by sawing or any similar process, to say nothing of the ease and facility with which the purpose of the

designer is accomplished. The papier mache workers do not, as is commonly supposed, cut out the papier mache and let in the pearl. The pearl is simply attached to the surface in the position required with copal varnish, and repeated coats of thick black varnish are put on until the surface is level with that of the pearl. A coat of varnish is then applied over the whole, and the pearl consequently concealed, to be afterward laid bare by rubbing down the black varnish with pumice-stone, after which it is polished by the application of rotten stone with the hand. The pearl is purchasable at painters' supply stores.

IVORY WORK.

Ivory is most frequently used with ebony in artistic cabinet work. It should be laid, where possible, with a caul, and cleaned off exactly the same as buhl work. When used in circular pilasters, doors, plinths, etc., it is sometimes necessary that it should be bent, as it is not always possible to procure pieces large enough for the purpose in the solid. If a molding is required for a circular corner, it should be first worked with a scratch and afterward made flexible, and then glued on the shape required. Owing to its brittleness, no attempt should ever be made to bend ivory before being made flexible.

To render ivory flexible, it should be immersed in a solution of pure phosphoric acid of specific gravity 1.130, and left there till it ceases to be opaque ; then it should be taken out, washed with clean water, and dried with a soft rag. If allowed to get hard, it must be soaked in hot water.

BLEACHING IVORY.

The method of bleaching ivory, as adopted by pianoforte-key makers, will answer for any kind of ivory work, the only difference being that the thicker the substance the longer it must remain in the solutions. The ivory, when cut into plates of the proper thickness for keys, is placed in a flat vessel, and a solution of carbonate of soda, in the proportion of ten ounces of soda to two pints of soft river water to each pound of ivory, is poured over it. This is allowed to remain for thirty-six or forty-eight

hours, when the solution is to be poured off, and the ivory washed several times in cold soft water; after this it is to be again immersed in a solution consisting of three-quarters of a pound of sulphate of soda and two pounds of strong salt-and-water to a pound of the ivory, and allowed to remain five or six hours. Two ounces of hydrochloric acid, previously diluted with four times its weight of water, are then to be stirred in, the vessel covered with a tight-fitting cap, and allowed to remain for thirty-six hours. The liquid is then poured off, and the ivory plates well washed and dried in the air. Should the desired degree of whiteness not be obtained by one operation, it can be repeated until successful. As the gases generated during the process are injurious to the lungs, it will be readily understood that the operation should be conducted in the open air, or in a chimney where the fumes can be carried off.

POLISHING IVORY.

When ivory is cleaned off with fine glass-paper, it is well rubbed with a piece of wet linen cloth dipped in powdered pumice-stone, which will give a very fine surface; the final polish may be produced with fine whiting applied by a piece of cloth wetted with soapsuds. Care must be taken in this and in every instance where articles of different fineness are used, that, previous to applying a finer, every particle of the coarser material be removed, and that the rags be clean, soft, and free from grit. Ornamental work must be polished with the same materials as plain work, using brushes instead of linen, and rubbing as little as possible, otherwise the more prominent parts will be injured. The polishing material should be washed off with clean water, and, when dry, may be rubbed with a clean brush. Horn and tortoise shell are so similar in their nature and texture, that they may be classed together. As regards the general mode of working and polishing them, a very perfect surface is given by scraping, papering, and the application of a buff made of woolen cloth perfectly free from grease. The cloth may be glued upon a stick to be used by hand, or a bob may be used, which is a wheel running in the

lathe covered with the cloth, and is much to be preferred on account of the rapidity of motion. The buff may be covered with either powdered charcoal and water or fine brickdust and water. After the work has been made as smooth as possible with this, it is followed by another buff or bob on which dry whiting is rubbed. The horn or tortoise shell is then moistened with acetic acid. The buff and whiting will produce a fine gloss, which may be completed by rubbing with the palm of the hand and a small portion of dry whiting or rotten-stone.

STAINING IVORY.

Black.—Aquafortis and iron filings, which should be made in a large earthenware pot and mixed out of doors. Put in the ivory and iron filings, then add the aquafortis. Be sure that the pot is large enough to prevent boiling over.

Blue.—Immerse for some time in a diluted solution of sulphate of indigo partly saturated with potash.

Green.—Boil in a solution of verdigris in acetic acid until the desired color is obtained.

Red.—Dip the ivory first in the tin mordant used in dyeing, and then immerse in a hot decoction of Brazil wood—half a pound to a gallon of water.

Scarlet.—Use lac-dye instead of the preceding.

Violet.—Dip in the tin mordant, then immerse in a decoction of archil and boiling water.

Yellow.—Immerse in nitro-hydrochlorate of tin, then boil in a strained decoction of fustic.

Horn or bone may be treated in the same manner as ivory for the various colors given.

MISCELLANEOUS RECIPES.

FURNITURE OILS.

These oils are used to freshen or revive oil or wax-finished furniture. They are applied with a woolen rag, and rubbed with the grain until the polish appears.

For Mahogany.—1. Linseed oil, 1 pint, alkanet root, ¼ lb.; digest in a warm place until colored.

2. Linseed oil, one pint; beeswax, ¼ lb.; melt with heat and color as in No. 1.

3. Linseed oil, one pint; Venice turpentine, 6 ozs.; for dark wood.

4. Nut oil, ¾ pint; beeswax, 3 ozs.

5. The same as No. 4 with 3 ounces of copal varnish added.

FURNITURE CREAM.

1. Pearlash, 2 ozs.; soft soap, 4 ozs.; bees wax, 1 lb. water, 1 gallon; boil until united.

2. Beeswax, ½ lb.; yellow soap, ¼ lb.; water 5 pints; boil until mixed; then add ½ pint each of linseed oil and turpentine. Dilute with water when using, apply with a painter's brush, and polish with a woolen cloth or hard brush.

3. Spirits of turpentine, 1 pint; alkanet root, ¼ oz.; digest until the color of the root is extracted, then add scraped wax, ¼ lb. Put in a warm place until fairly mixed. Apply as above. For light colored woods leave out the alkanet root.

4. White wax (bleached) dissolved in warm potash lye, or parafine in benzine or naphtha—for pale woods.

NOTE.—None of these revivers are particularly to be recommended except those composed only of wax, linseed oil and turpentine. When using this kind the furniture should be freed from dust and a woolen rag used to apply the article. Indeed, a woolen rag and linseed oil mixed with a little turpentine, for general use is the best thing that can be employed.

LIQUID GLUE.

An excellent liquid glue is made by dissolving glue in nitric ether. The solution can not be made too thick, as the ether will only dissolve a certain quantity of glue. It will be of about the consistence of molasses, and doubly as tenacious as that made with hot water. If a few bits of native india rubber, cut into scraps the size of buck-shot, be added, and the solution allowed to stand a few days, being stirred frequently, it will be all the better, and will resist dampness much more effectually than glue made with water.

MARINE GLUE.

Take half an ounce of native india rubber, cut into small pieces, and dissolve in a pint of naphtha. Allow it to stand until it becomes as thick as cream. To this add about double the quantity, by weight of shellac; heat the whole in an iron vessel, and well stir until the lac is thoroughly combined. It can then be poured out into shapes and will solidify as it cools. When the glue is wanted for use, one of the cakes has only to be put into an iron pot, and heated up to about 250 degrees, Fahrenheit, when it will commence to liquefy. It should be applied with a brush, and the surfaces united as quickly as possible, and pressed together for a short time. As soon as the glue has thoroughly set, the adhesion will be so perfect that the wood itself will break sooner than the composition will give way. This glue will also unite iron or glass.

FRENCH-POLISH REVIVER.

This recipe will sometimes be found useful. If the work is sweated and dirty, make it tolerably wet and let it stand a few minutes; then rub off and polish with a soft rag. It is important that the ingredients should be mixed in a bottle in the order as given: Vinegar, 1 gill; alcohol or methylated spirit, 1 gill; linseed oil, ½ pint; butter of antimony (poison), 1 oz.

MOROCCO LEATHER REVIVER.

The coverings of chairs or sofas in morocco, roan, or skiver can be much improved by this reviver. If old and

greasy, wash with sour milk first. The reviver should be applied with a piece of wadding, and wiped one way only, as in glazing. The color can be matched by adding red sanders. Alcohol or meth. spirits, ½ pint; gum benzoin, 2 ozs.; shellac, ½ oz. Mix, and shake up occasionally until dissolved.

A CHEAP FURNITURE VARNISH.

Gum sandarach, 1 lb.; pale rosin, 1 ½ lbs.; benzine, 2 gallons.

MASTIC VARNISH.

Mastic should be dissolved in oil of turpentine, in close glass vessels, by means of a gentle heat. This varnish is extensively used in transparencies, etc.

COPAL VARNISH.

Dissolve the copal, broken in pieces, in linseed oil, by digestion, the heat being almost sufficient to boil the oil. The oil should be made drying by the addition of quicklime. This makes a beautiful transparent varnish. It should be diluted with oil of turpentine; a very small quantity of copal, in proportion to the oil, will be found sufficient.

SEEDLAC VARNISH.

Wash three ounces of seedlac in several waters; dry it; and powder it coarsely. Dissolve it in one pint of rectified spirits of wine; submit it to a gentle heat, shaking it as often as convenient until it appears dissolved. Pour off the clear part, and strain the remainder.

BLACK VARNISH.

Mix a small quantity of gas-black with the brown hard varnish previously mentioned. The black can be obtained by boiling a pot over a gas burner, so that it almost touches the burner, when a fine jet-black will form at the bottom, which remove and mix with the varnish, and apply with a brush.

A Black Polish can be made in the same way: after wetting the rubber, just touch it with the black. Place the linen cover over, touch it with oil, and it is ready for work.

RED STAIN.

Two ounces of Brazil wood, two ounces of potash, one quart of water; mix. The mixture should stand in a warm place for several days, and be occasionally stirred. When required for use, it should be made boiling hot, and brushed over several times; and while wet a solution of alum (two ounces to a quart of water) should be brushed over.

BROWN STAIN.

Two parts of brown umber and one part of sulphuric acid; add spirits of wine or methylated spirits until it is sufficiently fluid.

TO REMOVE FRENCH POLISH OR VARNISH FROM OLD WORK.

Cleaning off old work for repolishing or varnishing is usually found difficult, and to occupy considerable time if only the scraper and glass paper be used. It can be easily accomplished in a very short time by washing the surface with liquid ammonia, applied with a piece of rag; the polish will peel off like a skin, and leave the wood quite bare. In carvings or turned work, after applying the ammonia, use a hard brush to remove the varnish.

CLEANING AND RE-LACQUERING OLD BRASS WORK.

This recipe will be found very useful to restorers or repairers of furniture for old brass work. First boil the articles in strong soda and water so as to get off the dirt and old lacquer; then scrub them with sand, and rinse them. The next process is the dipping, for which will be required an earthenware pan capable of holding the articles, which must be filled with sufficient aquafortis to cover them. Also, have ready at hand two pails of clean water and a box of sawdust,—if the sawdust could

be kept hot it would be all the better,—and a clean brush. Proceed as follows: Tie the articles on copper wire and dip them in the acid; then rinse in the water, and afterward well rub in the sawdust till thoroughly dry; then brush the sawdust off. If there are any parts that want relieving, this must be done with a bright steel burnisher and a little stale beer. The articles are then ready for lacquering. If allowed to get tarnished, to restore their brightness they must be dipped again, the acid to be diluted with ten times its weight of water; rinse and dry as before. When the lacquer is applied the articles should be laid on a hot plate, or in an oven, and made so hot that you can only just bear your hand on them. With a soft camel-hair varnish brush lay on the lacquer lightly. Care must be taken not to give it too thick a coating, nor to have the articles overheated.

LACQUERS.

Lacquers are used upon metals to keep them from tarnishing, and also to impart the appearance of gold. As they are wanted of different depths and shades of colors, is is best to keep a concentrated solution of each coloring ingredient ready, so that it may at any time be added to produce the desired tint. The following recipes are most excellent; if only a small quantity is required, divide the ingredients proportionately.

Gold Lacquer.—Put into a clean gallon tin ¼ lb. of brown turmeric, ½ oz. of powdered gamboge, 1 oz. of powdered gum sandarach, 3 ozs. of shellac, and 2 quarts of alcohol or methylated spirit; after being agitated, dissolved and strained, add a quarter of a pint of turpentine varnish, and well mix.

Red Lacquer.—2 qts. of alcohol or meth. spirits, ¼ lb. of dragon's blood, ¾ lbs. of Spanish anatto, 18 ozs. of gum sandarach, and ½ pint of turpentine. Made as before.

Pale Brass Lacquer.—2 qts. of alcohol or meth. spirits ¾ ozs. of Cape aloes cut small, ¼ lb. of pale shellac, ¼ oz. of gamboge powdered; no turpentine varnish. Made exactly as before.

Pale Tin Lacquer.—Strongest alcohol, four ounces;

powdered turmeric, two drams; hay saffron, one scruple; red sanders, half scruple. Infuse this mixture in the cold for forty-eight hours, pour off the clear, and strain the rest; then add powdered shellac, half ounce; sandarach, one dram; mastic, one dram; Canada balsam, one dram; dissolve this in the cold by frequent agitation, laying the bottle on its side to present a greater surface to the alcohol. When dissolved, add forty drops of spirits of turpentine.

Deep Gold Lacquer.—Strongest alcohol, four ounces; Spanish anatto, eight grains; powdered turmeric, two drams; red sanders, twelve grains. Infuse and add shellac, etc., as to the *pale tin lacquer*; and when dissolved add thirty drops of spirits of turpentine.

Lacquer should always stand till it is quite fine before it is used.

TO TRANSFER ENGRAVINGS FROM PAPER TO WOOD.

This process is much used in the small fancy articles known as Tunbridge ware. The block for the engraving should be cut so that it prints the reverse way, otherwise when the print is transferred to the wood, objects on the left hand will appear on the right. The work is chiefly made of white holly and well cleaned off. The engraving is wetted on the back with spirits of wine, and is laid on the work where required, the face downward, and a soft pressure immediately applied; when dry, remove the paper, and the engraving will be transferred.

CARVERS' SQUEEZING WAX.

This preparation is used for obtaining the exact patterns of carvings, and to give the workman a clearer idea of projections or depths than a drawing would do, unless a considerable time were expended upon it. In cases where it is required to match furniture which is at a distance and can not be removed, the wax can be applied without injury to the carving, and can be made from either of the following: viz., suet, one part; beeswax, two parts—or wax, five parts; olive oil, one part—or wax, four parts; common turpentine, one part. The parts only need to be melted together, and allowed to

cool; the wax is then fit for use. It should be well pressed into the carving. Sometimes it is only possible to take the front or side of an object at a time, as it must be drawn off in the form of a mold. The sections when ready should be filled with plaster of Paris and water made into a thick paste, and allowed to set; the mold is then removed, and the plaster cast is ready to work from.

TO REMOVE GREASE STAINS FROM SILKS, DAMASKS, CLOTH, ETC.

Pour over the stain a small quantity of benzoline spirits, and it will soon disappear without leaving the least mark behind. The most delicate colors can be so treated without fear of injury. For paint stains, chloroform is very efficacious.

TO REMOVE INK STAINS FROM WHITE MARBLE.

Make a little chloride of lime into a paste with water, and rub it into the stains, and let it remain a few hours; then wash off in soap and water.

TO REMOVE IRON OR INK STAINS FROM OAK, ASH, OR MAHOGANY.

Two pennyworth of oxalic acid dissolved in a pint of warm water, to which is added a few drops of spirit of nitre. This preparation when applied to a stain will remove it almost instantly.

A NEVER-YIELDING CEMENT.

Pound calcined oyster shells, sift the powder through a silk sieve, and grind it on a marble slab till reduced to the finest powder; then take the whites of several eggs, according to quantity required; beat them well, and having mixed them with the powder, form the whole into a kind of paste. With this paste join pieces of china, glass, or marble, pressing them together for a few minutes. The united parts will stand heat and water, and will not come apart if they should fall on the ground.

A USEFUL CEMENT.

Best isinglass, ½ oz.; strong acetic acid (vinegar), 1 ½ ozs. Cut the isinglass fine with scissors, and dissolve by putting the tin or bottle in hot water. This cement will stand water and any amount of rough usage, but not strong heat. For joining marble or any similar material, a little of the powdered oyster shell, as given in the preceding recipe, should be added, and the parts made hot before joining; the cement to be used as thin as possible. This is usually sold by chemists as Persian cement, or coaguline.

TO APPLY SOLDER TO CELLARETS.

To make soldering fluid that will cause solder to run over or through any metal, take six pennyweights of zinc, clean and cut in small strips from the sheet, and place it in an earthen cup; then put on one and a half pennyweights of subnitrate of bismuth, and pour on one ounce of muriatic acid. It will boil furiously. Let it stand a day or two, stirring it occasionally; allow it to settle, and pour off the clear liquid for use. The edges of the pieces to be soldered are first filed; then wetted with the metalic solution; the edges are brought together, a piece of solder is laid on, and the hot soldering tools applied in the usual manner.

HORSE-SHOEING.

HORSE SHOES IN HISTORY.

The Romans shod their horses, though not in the same way as we do. Their pedillum* lapped over, and therefore occasioned a rattling sound. Winckelmann has published a drawing of a Roman gem, showing one man holding up the foot of a horse, and another man shoeing it. An iron horse-shoe is mentioned by Appian; but shoes (carbatinæ) made of raw hides were, as Aristotle and Pliny attest, put upon camels in the time of war and during long journeys. Nero is said, by Suetonius, to have shod his mules with silver. Pliny records of Poppæa, the empress of Nero, that she used gold for the same purpose. These shoes had probably the upper part only formed of the precious metals, or perhaps they were plated out of thin slips.

In the horseshoes found in the German barrows, says Fosbroke, the shoes project not downward, but upward. At Colney, in England, were found Roman urns, and a horse-shoe of uncommon form—round and broad in front, narrowing very much backward, and having its extreme ends almost brought close behind, and rather pointing inward, with the nail-holes still perfect. An early instance of nails in horseshoes is furnished by one of a horse buried with Childeric I., who died 481, which was fastened with nine nails (Archæologia, iii, 35). Du Cange and Carew mention the custom of shoeing only the fore-feet. La Brocquiere describes the oriental horseshoes as being very light, rather lengthened toward the heel, and thinner there than at the toe. They were not turned up, and had but four nail-holes,

*Shoe.

two upon each side. The nails were square, with a thick and heavy head.

The present mode of shoeing horses was introduced into England by the Normans, at the time of the conquest. The Britons had been taught the use of them by the Romans, but their pedolan were probably considered too clumsy to be adopted by the Saxons. The Franks in the ninth century, and probably also the Normans, shod their horses in winter only.

It may be mentioned, that the male horse only was ridden by knights and people of any distinction in the middle ages; and that to ride a mare was always looked upon as a degradation. This was either a religious superstition, or an old Teutonic prejudice. In the thirteenth century, horses were obtained from Turkey and Greece, and at a later period from Barbary. The lord rode the destrier, or war-horse; the lady, the palefroi, or palfrey; the servant, the roncin; and the luggage was carried by a sommier, or sumpter. White horses were most prized, after them dapple-gray, and bay or chestnut. It is curious to find that, in 1435, the queen of Navarre gave carrots to her horses. The ordinary price of horses in England, in the reign of Edward I., was from one to ten pounds. When St. Louis returned to France from his captivity, the abbot of Cluny presented to the king and queen each a horse, the value of which Joinville estimated at five hundred livres—equal to about four hundred pounds of the present English money. Feats of horsemanship were much practiced; one of these was to jump into the saddle in full armor:

> No foot Fitzjames in stirrup staid,
> No grasp upon the saddle laid,
> But wreathed his left hand in the mane,
> And lightly bounded from the plain.

Horses were frequently given as bribes. The widow of Herbert de Mesnil gave King John of England a palfrey to obtain the wardship of her children, and one Geoffrey Fitz-Richard gave the same monarch a palfrey for a concession in the forest of Beaulieu.

A large pitcher, ornamented with horseshoes, was found in a Norman pottery, discovered on the estate of Lord Scars-

dale, near Derby. It is figured in the reliquary, and is a very interesting example of the period. The decoration is the badge of the ancient lords of the soil on which the vessel was made, and it was probably designed for castle use. The badge is that of the family of Ferrars, earls of Derby, Ferrars, and Nottingham, who held Duffield castle from the time of Henry III., when the lands were confiscated.

In Lord Herbert's Life of Henry VIII., we read that Henry "having feasted the ladies royally for divers days, did depart from Tournay to Lisle (October 13, 1513), whither he was invited by the Lady Margaret, who caused there a joust to be held in an extraordinary manner; the place being a large room, raised high from the ground by many steps, and paved with black square stones like marble; while the horses, to prevent slipping, were shod with felt or flocks (the Latin words are feltro sive tomentô), after which the ladies danced all night." Shoeing with felt is mentioned by Shakespeare.

Aubrey, in his Miscellanies, says: "Under the porch of Staninfield Church, in Suffolk, I saw a tile with a horseshoe upon it, placed there to hinder the power of witches, though one would imagine that the holy water would have been sufficient." The charm of the horseshoe lies in its being forked, and presenting two points. Thus Herrick, in his Hesperides, says:

Hang up hooks and sheers, to scare
Hence the hag that rides the mare,
Till they be all over wet
With the mire and with the sweat;
This observed, the manes shall be
Of your horses all knot-free.

Even the two forefingers held out apart, are thought to avert the evil eye, or prevent the machinations of the lord and master of the nether world.

The pentacle, or seal of Solomon, is supposed to possess great power, as being composed of two triangles presenting six forked ends, and therefore called pentacle erroneously.

Mr. Timbs states, that when Monmouth street was a fashionable locality of London, it was noted for its number of horseshoes nailed over the doorways or on the sill. In 1813,

Sir Henry Ellis counted here seventeen; in 1841, there were six, but in 1852, there were eleven; now there are fewer. Nelson had great faith in the horseshoe, and one was nailed to the mast of the ship Victory. "Lucky Dr. James" attributed the success of his fever-powder to his finding a horseshoe, which he adopted as the crest upon his carriage. A horseshoe is very conspicuous at the gate of Meux's brewery, at the corner of Tottenham court road, and on the trappings of the horses of the establishment. The lucky belief in the horseshoe may have led to its having been adopted as the ornamental portion of a scarf-pin.

Messrs Larwood and Hotten, in their History of Sign-boards, state that the horseshoe by itself is comparatively a rare sign. The three horseshoes, however, are not uncommon; and the single shoe may be met with in many combinations, arising from the old belief in its lucky influences. The sun and horseshoe is still a public house sign in Great Litchfield street; and the magpie and horseshoe may be seen carved in wood in Fetter lane—the magpie perched within the horsehoe, and a bunch of grapes being suspended from it. Slight remains of this superstitious regard for the horseshoe are to be found here and there in the United States.

THEORY AND PRACTICE.

Before I enter on the subject of shoeing, I must notice two things, which we must not only believe, but act upon, if we ever hope to arrive at really good horseshoeing; the first is, that nature has given to what horsemen call a good shaped foot the form best suited to the horse's wants; and the second is, that the hoof expands, when the horse's weight is thrown upon it, and contracts, when it is taken off again; but the mere belief in these things will be of no use, unless we make the shoe to fit the foot, and nail it on in such a manner, as will allow the hoof to expand and contract; for we might as well not believe at all, as believe a thing to be right, and not do it.

Nailing an iron shoe to a living horse's foot is a very un-

natural thing to do, but, as it must be done, it is our duty to see how we can do it with the least damage to the horse To show this, I will suppose myself addressing a young smith, who is about to shoe his first horse.

PREPARING THE FOOT.

You must begin by taking off one of the old shoes, and I say one, because the others should always be left on, for the horse to rest upon: all horses stand quieter on shod feet than they can on bare ones; and they are less likely to break the crust; many tender footed horses are in positive agony, when forced to rest on a bare foot, while the opposite one is held up, to be shod.

First raise all the clinches with the buffer, and if the shoe will not then come off easily, loosen some of the nails with the punch; but never tear the shoe off by main force; it splits the crust, widens the nail holes, and destroys the horn.

The shoe being off, you should rasp the edge of the hoof all round, and take out any stubs, that may be left in the crust. Then you must pare out the foot; and this requires both care and thought. If the horse has a strong foot with plenty of horn, you should shorten the toe, lower the heels and crust, and remove the dead horn from the sole, and also from the corners between the heels and the bars; the best way of doing this is to pare the bars down nearly level with the sole, and then you can get at the dead horn in the corners more easily. The part of the bar which stands up above the sole, would have been worn away, or broken down, if the shoe had not kept the hoof off the ground: therefore you had better always pare it down; but on no account ever cut anything away from the sides of the bars, nor, what is called, "open out the heels;" and be sure, that you never touch the frog with a knife. Now remember, that there are three things, which you must never do in paring out a foot; you must never cut the sides of the bars, nor open out the heels, nor pare the frog; and I will tell you why you must never do them.

The bars are placed where they are, to keep the heels from closing in upon the frog, and if you thin them by cutting their sides, you weaken them, and they can no longer do it, and the foot begins to contract.

Opening out the heels does exactly the same thing by weakening the very parts which nature placed there, to keep the heels apart. It takes some time to contract a horse's foot so much as to lame him; and because the contraction comes on by slow degrees, no one notices it, until the horse falls lame, and then every one wonders what can have done it; but very few hit upon the right cause.

The frog is a thick, springy cushion, whose chief use is to protect a very important joint, called the navicular joint, and it is covered by a thin layer of horn, which keeps in the moisture; and every time you slice off any of the frog, you lay bare a part that was never meant to be exposed to the air, and it dries, and cracks, and forms rags; and if these rags are cut off at every fresh shoeing, the whole frog becomes as dry and hard as a board; and the horse gets an incurable disease, called "navicular disease;" therefore I say, leave the frog alone; it will never grow too large; for long before that would happen, the outer covering will shell off, and a new, horny covering will be found underneath; and as to the rags, leave them alone also, and they will fall off of themselves.

A weak, flat foot will bear very little paring, or rasping; the crust of such a foot is sure to be thin at the toe, and low at the heels, with a thin and weak sole; therefore the less you do to it the better, beyond making the crust level, where it is to bear upon the shoe; this must be done to all feet, and as the inner quarter, where there should be no nails, does not wear away as fast as the outer quarter, where the nails are driven, you should always place a rasp upon its edge across the foot, to be quite sure that the two sides are level. I have known shoes lost from the inside quarter being higher, than the outside; which caused the foot to bear unevenly on the shoe.

Before you pare out a foot, you should always think of the state of the roads, and if they are dry, and covered with loose stones, or have been lately repaired, you should take

very little off the sole of any foot because, if you thin it the stones will bruise it, but when the season is wet, and the stones worn in, you may pare the sole of a strong foot a little, until it will yield in a very slight degree to the heaviest pressure you can make upon it with your thumbs; but you must never pare it thin enough to yield to less pressure than the very heaviest you can bring to bear upon it.

Fig. 1 shows a good shaped near fore foot pared out ready for shoeing. I have placed letters against the different parts. The toe reaches from A to A, the letter B shows the middle of each quarter, and C marks the heels. You will observe that the crust is thicker on the outer quarter, where the nails should be, than it is on the inner quarter, where a nail must never be driven; and you will also see that the hoof is not a circle, as many persons suppose it to be, but is straighter on the inside, than it is on the outside. D marks the sole, E shows the upper parts of the bars pared down nearly level with the sole. F shows that part which must never be touched by a knife, G marks the frog, and is placed just over the situation of the navicular joint. I would advise you to examine this frog well, because it is, what every horse's frog should look like, plump, full and even, with a broad, shallow cleft, not split through at the back part; and if you shoe your horses properly, and never pare the frog, it is what their frogs will come to in time.

THE SHOE.

Before I talk about the shoe, I must settle names for the upper and under surfaces; because I fear I should mislead those who are not smiths, if I call the part that rests upon the ground "the upper surface," as smiths do; I shall therefore call that part of the shoe "the ground surface;" and the part which goes next the foot I shall call "the foot surface;" and then there can be no mistake as to which surface I mean.

In turning your store shoes "in the rough," you should

leave them longer at the heels, than smiths generally do; we shall see the reason for it, when we come to "fitting the shoe;" and you should make the web as wide at the heels as it is at the toe, and of the same thickness throughout from the toe back to the heels. The "fuller" should be carried quite round then to the heels, and the fullering iron should have both sides alike. It is a far better tool than the one-sided iron in common use, which is generally so narrow and sharp, that it not only makes the groove too small for the heads of the nails to sink into, but it often splits the shoe. A narrow groove may look neater than a wide one; but you will find a wide one much more useful.

Fig. 2.

CHOOSING A SHOE.

The first thing to look to in choosing a shoe is the kind of foot you have to deal with. If the foot be a strong, good shaped one, it will be an easy matter to find a shoe for it; only be sure to take great care that the web is not too narrow, and that the shoe is not too light. A light shoe is apt to bend, before it is half worn out; and the pain, caused by the pressure of the bent nails against the tender lining of the hoof throws the horse down, and most likely breaks his knees. If the foot should be flat with a weak, brittle crust, you must still choose a stout shoe; for a horse with such a foot could not go at all on a bent shoe; and the shoe must have a wide web, because the sole is sure to be thin, and will need plenty of cover to protect it.

You must also look at the seating, for, if the foot is weak and flat, the shoe must be well seated out, to prevent its pressing upon and bruising the sole; but, if the foot is strong, and the sole arched, there need not be more seating than will allow the point of a picker to pass freely round between

the sole and the shoe; otherwise dirt and small stones will get in, and bruise the sole as much as the shoe would do, if it pressed upon it.

CUTTING OFF THE HEELS.

Fig. 3.

Having fixed on a shoe to your mind, begin by cutting off the heels; and you will find a half round chisel a better tool for the purpose, than a straight one, because you should never cut them off square, if you do, you will find it impossible to fit the shoe properly to the heels, and at the same time keep the web as wide at the heels, as it is at the toe; for one of the corners of the shoe will be sticking into the frog, while the other stands out beyond the crust; but, if you cut them off as shown in Fig. 4 you will have no difficulty in bringing every part of the shoe into its proper place on the foot. Fig. 1 is a shoe turned in the rough; and the dotted lines show the direction, in which the heels should be cut off. The side next the frog should be cut off from C to B, and the outer corner from A to B, and then the shoe will look like Fig. 5, which with a little hammering over the beak of the anvil will soon come like Fig. 6; you will see that the points marked A in Fig. 5 have disappeared in Fig 6, and that the parts between A and B on each side have become a portion of the outer rim of the shoe; whereby the outer rim is lengthened and the inner rim shortened; and there are no corners left to prevent your fitting the shoe to the exact sweep of the crust at the heels, and you are also enabled to keep the web as wide at the heels as it is at the toe. I have introduced Fig. 6 in this place, because it gave me the opportunity of explaining the reason for cutting off the heels, as I have directed; but at this stage of the business it is a good plan always to

leave the quarters and heels rather straight and wide apart, until you have fitted the toe; because it is less trouble to bring them in, than it is to open them out, after the front has been fitted.

THE NAIL HOLES.

You must next open the nail holes; but be sure that they have been stamped so as to pass straight through the shoe, and come out on the foot surface in the flat part of the we', and not partly in the flat and partly in the seating. It is a very bad plan to make them slant inward as most smiths do; for in driving a nail, they have first to pitch the point inward, then turn it outward, driving it all the time with the grain of the crust, and at last they bring it out high up in the thinnest part of the hoof, and have the weakest part of the nail for a clinch. Now, instead of all this, if you make the holes straight through the shoe, you have only to drive the nail straight, and it will go through the shoe across the grain of the crust, and come out low down in the thickest part of the hoof, and give you a strong clinch, made out of the shank of the nail, instead of a weak one made out of the point. The advantage of straight holing is, that you are sure never to prick the foot in driving a nail, and you get a

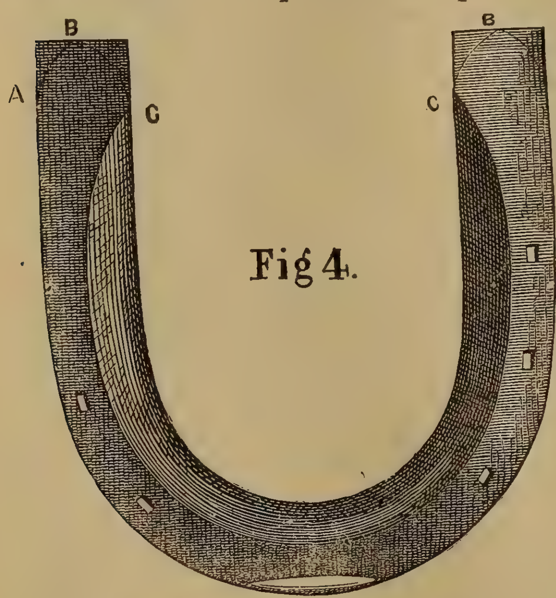


Fig 4.

firmer hold for the shoe; every body knows, that a short purchase across the line of the strain is stronger than a longer one in the direction of the strain.

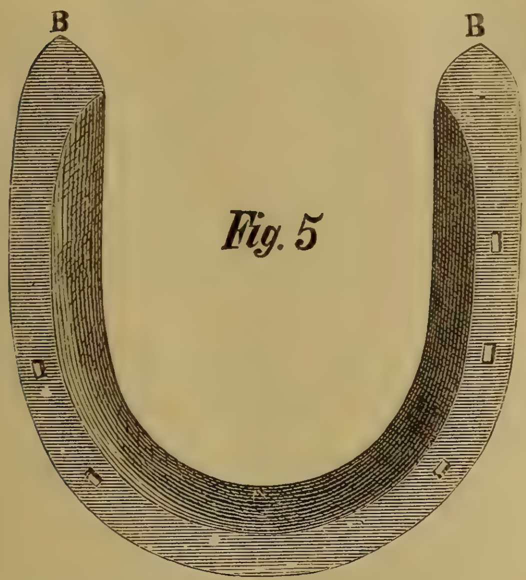


Fig. 5

The soundness of the horse's foot, so far as shoeing is concerned, depends more upon the number of nails, and where they are placed, than upon anything else; for, if the shoe is ever so badly formed and the nail holes are rightly placed, very little harm will happen to the foot beyond the loss of a shoe; but, if the shoe is of the best possible shape, and fitted to the foot in the most perfect manner, unless the nail holes are placed so that the foot can expand it must in the end become unsound. The portion of hoof which expands the most is the inner quarter and heel; you must therefore leave those parts free from nails: and the way to do it is never

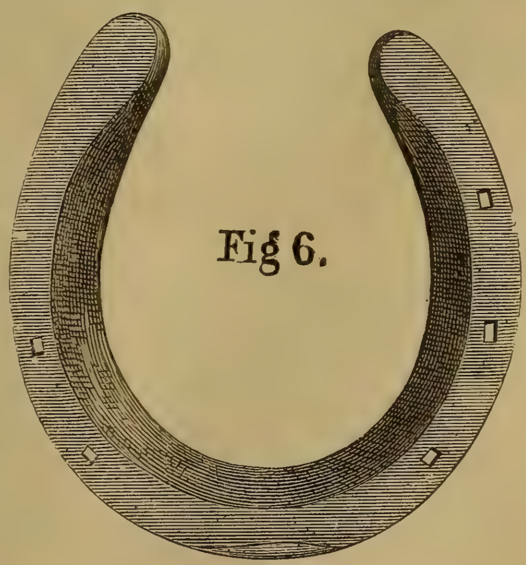


Fig 6.

to stamp more than two holes on the inside of the shoe, one about an inch and a quarter from the center of the toe, and the other about three quarters of an inch behind it. It is quite clear that if you nail both sides of a horse's hoof to an iron shoe, the hoof will be held fast and cannot expand; and when the horse's weight forces the bones of the foot into the hoof the tender lining of the hoof will be squeezed against the shanks of the nails, and cause pain to the horse at every step he takes. The whole number of nail holes should never exceed five; three on the outside and two on the inside. I have proved over and over again, that five nails will hold on a fore shoe at any kind of work, in any country, and at any pace. When a shoe is properly fitted to the foot, and fastened by five nails, nothing but the smith's pincers can pull it off.

Having cut off the heels, and opened the nail holes, you must next turn up a clip at the toe; every shoe should have one at the toe, it keeps the shoe steady, and prevents its being forced back; but you should never put one at either side, for if it were put on the inside, it would prevent the hoof expanding; and on the outside it is worse than useless, for the nails there are quite sufficient to keep the shoe from working across the foot, and the clip will interfere with the placing of one of the nails, and will destroy more of the crust, than two nails would have done.

FITTING THE SHOE

You must always bear in mind, that "fitting the shoe" means fitting the shoe to the foot, and not fitting the foot to the shoe, as is too often done in many forges.

It is a bad plan for a beginner to try to fit the whole of the shoe at once; it is much better, until you have had a good deal of practice, to fit the toe first, then the quarters, and lastly the heels; but, before you begin to fit the toe, take a look at the old shoe, and see how much of the toe of it is worn away; because just so much of the new shoe

should be turned up from the ground, to remove it out of the line of wear.

We all know that horses go better and stumble less in old shoes than they do in new ones, and the reason why they do so, is, because they have worn away the toe, and no longer jar the foot by striking the toe against hard substances in the road. A new shoe turned up at the toe, is the same thing to the horse as an old one worn down; but with this great difference to his comfort, that he is easy upon the new one from the time it is first put on, whereas he was never easy upon the old one, until he had worn away the toe.

When a horse wears his shoe hard at the toe, it is the custom of most smiths to weld a lump of steel on to it, to make him longer in wearing it away; but this only increases the jar to his foot; whereas turning up the toe makes the shoes last quite as long, and saves the horse from a great deal of unnecessary suffering. A strong foot will bear the toe to be turned up a good deal; but a flat foot is always weak at the toe, and cannot bear the removal of any of the horn from it; the best way therefore of dealing with a very flat foot is to fit the shoe to it without turning up the toe, then to make the toe of the shoe red hot, and place it in the vice with the ground surface toward you, and in that position rasp the iron away from that part of the toe, which would have rested on the ground; the horse will travel safer and better for it, and the loss of a little iron from the toe will not cause the shoe to wear out faster; for a flat-footed horse will generally wear away the heels of a shoe long before he has worn out the toe.

You can make a very handy tool for turning up the toe of a shoe by "shutting" a piece of iron five inches long and one inch broad, crosswise on to each blade of a pair of smith's tonges; with this tool you will be able to grasp both limbs of the shoe at once, and not only turn up the toe over the end of the anvil, but restore the seating at the toe without bending the shoe, or putting it out of shape; which you could not do without a great deal of trouble by holding one limb at a time in common tongs. The accompanying figure shows you this tool in use with the ground surface of

the shoe uppermost, for turning up the toe, and you have only to reverse it, keeping the same grasp of the shoe, and the foot surface will come uppermost, ready to have the seating made good.

I will now suppose that you have turned up the toe of the shoe, shortened the toe of the hoof, rasped the crust, to receive the turned up shoe, and cut a notch for the clip; you had better next, until you have gained experience in fitting a shoe, "spring" the heels, to prevent their burning

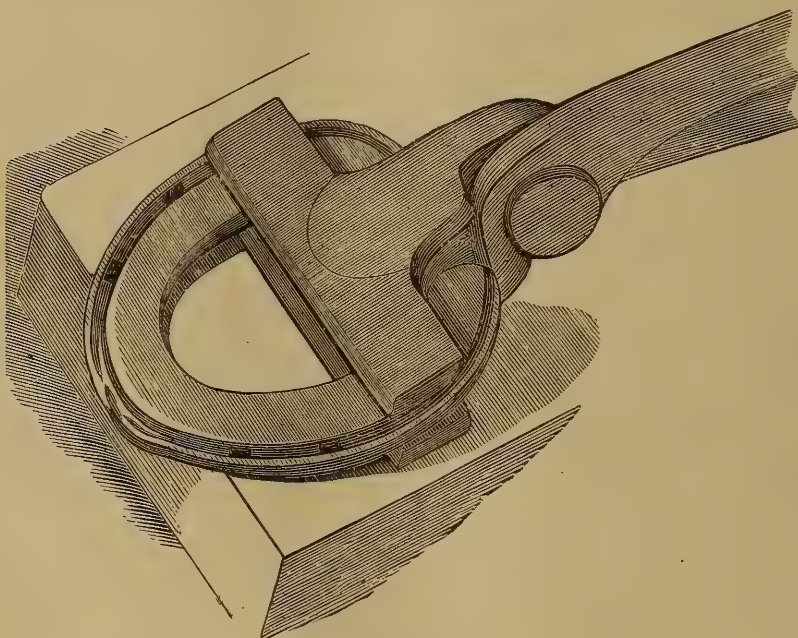


Fig. 7.

the back part of the crust, while you are fitting the shoe to the fore part; but you must bring them down again, before you fit the quarters and heels, and never leave them "sprung" when the shoe is nailed on.

You must now put the toe of the shoe in the fire, and make it hot enough to mark the uneven portions of horn, which should be lightly removed by the rasp, until an even bed is left for the shoe to rest upon. You need not fear to burn the toe of a strong foot; it can do no harm; but a

weak foot with a thin crust of course will not bear much burning, still the shoe should be made hot enough to scorch the horn, and show where the hoof fails to bear upon it.

When the toe is once properly fitted, there will be very little trouble in fitting the quarters and heels; you have only to bring them in over the beak of the anvil, until the edge of the shoe ranges with the edge of the hoof back to the furthest point of the heel on each side, and continue the same sweep, until it nearly touches the frog; there must be none of the shoe left sticking out beyond the hoof either behind, or at the sides of the heels.

I know that a great many smiths are very fond of what are called "opened heeled shoes," which means shoes with straight heels, wide apart, and projecting beyond the hoof both behind and at the sides; and the only reason I have ever heard in favor of such shoes is a very bad one, viz.: that the horse requires more support at the heels, than he gets from the hoof; but you may depend upon it, that nature has made no mistake about it; and if the horse really wanted more support, than he gets from the heels of the hoof, he would have had it; but I think I shall prove that this kind of shoe instead of being a benefit to the horse is a positive evil to him; it interferes with his action, and exposes his sole and frog to serious injury from stones in the road; and the projecting portions of the shoe become ledges, for stiff ground to cling to, and pull the shoe off. More shoes are lost through these mischievous projections at the heels, than from all other causes put together.

Let us see how it is that these projecting heels interfere with the horse's action. It is not necessary for this purpose to trouble you with the anatomy of the foot, but merely to state that all its parts are joined to each other in such a manner as to form one great spring, and that the foot is joined to the leg by the pastern and coronet bones in a direction slanting forward, which brings the foot a little in advance of the leg, and places the heels in front of a line, dropped from the center of the fetlock joint to the ground.

1 The shank or cannon bone.

2 The pastern bone.

3 The coronet bone.

4 The sessamoid bone.

A. The point where the weight of the horse would fall on the upper end of the pastern bone.

B. The point where a line dropped from A would meet the ground.

C. The heel of the hoof.

Fig. 8.

Now it is clear that the weight of the horse will fall upon the upper end of this slanting pastern bone at every step, and the bone having a joint at each end of it will sink to the weight thus thrown upon it, and break the force of the shock both to the leg and foot; but, if the heels of the shoe are longer than the heels of the hoof, the projecting pieces of iron will meet the ground further back than natural heels would have done, and will check the sinking of the pastern bone just as an upright pastern does, by bringing the heels too much under the center of the weight, which causes the horse to step short and go stumpy.

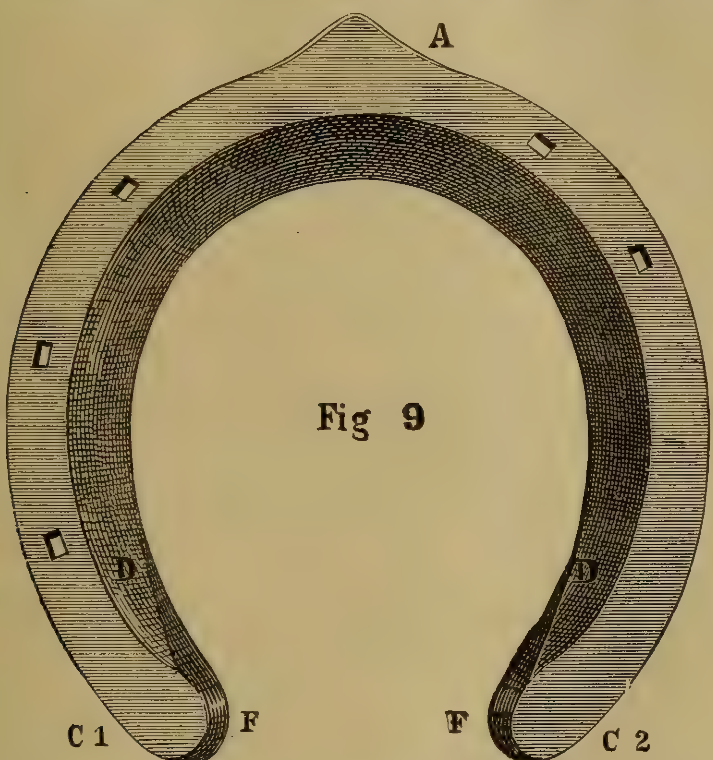
If you wish to avoid these evils and keep tne norse's shoes on his feet, you must bring in the hee'ls, and let the shoe strictly follow the form of the foot, whatever that form may be.

The part of the foot that needs protection from injury more than any other, is the "navicular joint," which rests upon the frog about an inch, or an inch and a quarter behind its point; and the only way to protect it is to keep the web of the shoe as wide at the heels as it is at the toe, and to bring in the heels until they nearly touch the frog; by so doing you lessen the opening of the shoe, and the web of one side or the other will strike upon the stones in the road and save the frog from coming with full force upon them. But open-heeled shoes leave the frog entirely exposed to very large stones and are the cause of many a severe bruise

to the navicular joint, which lays the foundation of future incurable lameness.

I have often seen shoes so wide at the heels, that I have placed my clinched hand within the opening of the shoe without touching either side of it; and where my fist could go a stone as large could go.

Another great advantage of bringing in the heels and



fitting the shoe close is the certainty that the horse will not cast his shoe; you leave nothing for stiff ground to lay hold of, and if you slightly bevel the inside quarter and heel of the shoe from the foot downward, as is sometimes done to prevent a horse cutting, no ground in the world can pull it off; for the foot expanding to the weight of the horse, enlarges the hole made by the shoe, and leaves more space for the shoe to come out of, than it made for itself to go in at:

but, if the shoe projects beyond the hoof at any part, and more particularly at the heels, the foot cannot fill the hole made by the shoe, and stiff clay will cling round the projection and pull the shoe off.

Having so far finished the shoe, place it on the face of the anvil with the toe hanging over the side, and see that the foot surface of the quarters and heels are quite level; then make it hot enough to scorch the hoof all round and form a bed for itself; without this it would be next to impossible to insure close fitting, for after you have made the foot as level as you can with the rasp, and the shoe as level as you can on the anvil, the chances are very much against their fitting like two planed boards, as they ought to do; and the quantity of horn to be thus removed is so small as not to be worth thinking about. It is a mistake to suppose that a hot shoe injures the hoof; it does nothing of the kind, and you cannot possibly fit a shoe properly without making it hot. I would not have you burn a shoe into its place on the foot before you had taken care to make both the foot and the shoe as level as you could, but when you have done that, the small quantity of burning that is necessary to make them come close together can do no harm. I have said before that a weak thin crust will not bear as much heat as a strong one, and that the shoe should be applied less hot to it, nevertheless it must be scorched that you may be sure the shoe fits properly.

When you have cooled the shoe, you should "back hole" it, that is, make free openings on the foot surface for the nails to pass through; and these openings should be large enough to take the shanks of the nails and not merely the thin part toward their points, and mind that in opening them you do not make the holes incline inward, but take great care to make them pass straight through the shoe.

Before you "file up" the shoe, hold it firmly in its place on the foot with both hands, and examine carefully whether any light appears between the foot and the shoe, and if you should perceive any, alter the shoe at once; for the crust must bear upon the shoe all round before you can say that the shoe fits the foot as it ought to do.

FILING UP THE SHOE.

Much time is often wasted in polishing the shoe with the file before it is nailed on; but all that is really needed is to remove the burs about the nail holes, file off the sharp edges of the shoe and round the heels, taking care to apply the file hard to that part of both heels which comes next

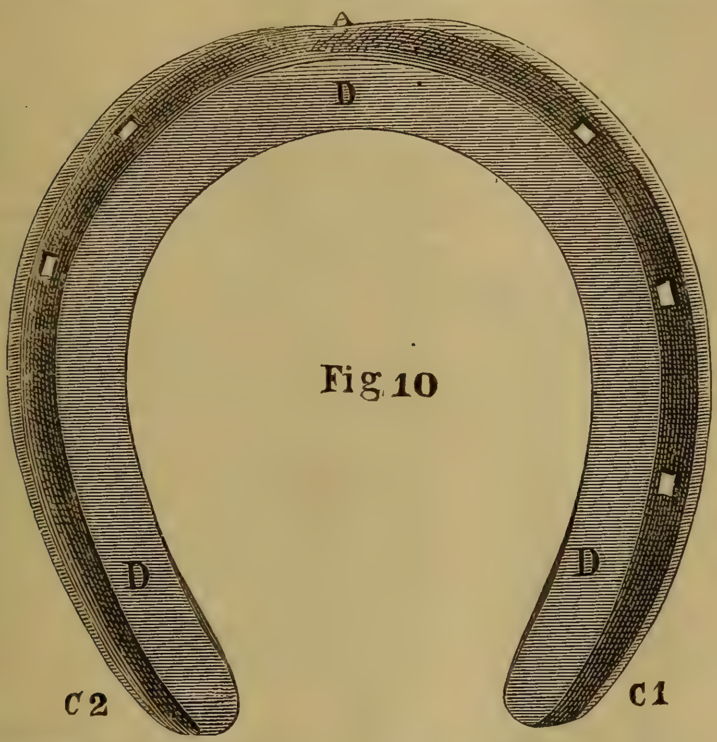


Fig. 10

to the frog, so as to slant it from the ground upward away from the frog, but you must be careful not to make the ground surface of the web at the heels narrower in so doing; Fig. 9 shows the foot surface, and Fig. 10 the ground surface of a near fore shoe.

In Fig. 9 A is the clip at the toe, B 1 the outer quarter, B 2 the inner quarter, C 1 the outer heel, C 2 the inner heel, D the seating, E the flat surface for the crust to bear upon, F the heels beveled off away from the frog.

In Fig. 10 A is the toe turned up out of the line of wear, B 1 the outer and B 2 the inner quarter, C 1 the outer and C 2 the inner heels, D the ground surface of the web, as wide at the heel as it is at the toe, E the fuller carried all round the shoe, F the inner quarter and heel slightly beveled from the foot to the ground.

NAILS.

I must say a few words about the nails before we come to nailing on the shoe, because the nails in common use, Fig. 11, are as badly formed as they well can be; their short wedge-shaped heads, wide at the top, *a*, and narrow at the bottom, *b*, with shanks springing suddenly from the head without any shoulder and ending in a long, narrow point, *c*, are most unsafe to trust a shoe to. The head of such a nail can never perfectly fill the hole in the shoe, for the wide top gets tied either in the fuller or the upper part of the hole before the lower part has reached the bottom, and when the shoe is about half worn out the head of the nail is gone and the shank alone is left in the hole to keep the shoe on. Now the nails I advise you to use, and you had better always make them for yourself, Fig. 12, should have heads which are straight sided at the upper part, *d*, and gradually die away at the lower part into the shank so as to form a shoulder, *e*, which will entirely block the bottom of the nail hole; the point *f* at the end of the shank should be short and broad to enable you to form good stout clinches, which will assist in keeping the shoe firmly in its place until it is quite worn out.

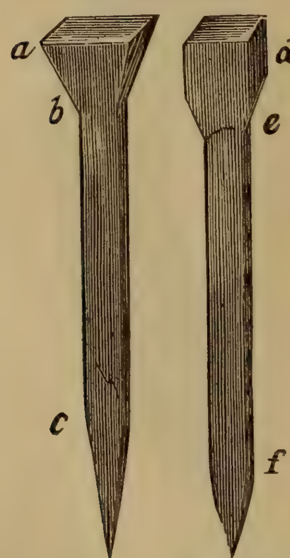


Fig. 11. *Fig.* 12.

If you compare the head of the nail, Fig. 12, at *d* and *e* with the head of the nail Fig. 11 at *a* and *b*, you will at once see that the head of Fig. 12 is better calculated to fill every part of the nail hole than the head of Fig. 11 with its broad top and narrow neck could possibly do; and if you compare the points of the two nails at *f* and *c* you will readily perceive which promises the firmer clinch.

Your nails should be made of the very best nail rods you can get, and they should not be cooled too quickly, but left spread about to cool by degrees; the longer in reason they are cooling, the tougher they will become; they should not however be allowed to lie in a heap to cool, the mass keeps in the heat too long and makes them almost as brittle as if they had been cooled too suddenly.

NAILING ON THE SHOE.

If the nails are of a proper shape, the holes straight through the shoe, and the shoe fits the foot, it requires very little skill to nail it on; only put the point of the nail in the middle of the hole, keep the nail upright, and drive it straight, it must come out in the right place, low down in the crust, without the possibility of wounding the sensitive parts of the foot. The shank of the nail will pass straight through the substance of the crust, and gain a good, firm hold of it, leaving you the strongest part, from which to form a clinch. The clinches should be short and broad, and not thinned by rasping away any of their substance, but hammered at once into a slight notch made in the hoof under each; and the rasp should never be allowed to go over them after they have been hammered down, for the sharp steel rasp is almost sure to cut through the soft iron clinch just where it turns down and leave the appearance of a clinch, when in truth it has been cut off at the bend, and the loose end only remains buried in the notch in the hoof. You will do good by rasping below the clinches, because you will thereby remove the broken horn that the former nails have destroyed; but on no account ever use

the rasp above the clinches, if you do you will tear off the thin outer covering of the hoof which is placed there to prevent the escape of the natural moisture and to keep the horn tough, and if you rasp it away you will expose the horn to the air and it will soon become dry and brittle and make the hoof difficult to nail to. This thin covering of the hoof is like the shining covering of a man's finger nail;

Fig. 13.

and most people know from experience how dry and brittle and easily broken a finger nail becomes when by accident it loses that covering.

Fig. 13 represents the ground surface of a near fore foot with the shoe nailed on by five nails, and shows how the shoe should look in its place on the foot; Fig. 14 represents the same shoe made transparent, so that the parts of the foot that are covered by it are seen through it. A shows the crust B the bars, and C the heels of the hoof supported by the shoe. By this plan of shoeing the whole

of the inner quarter and heel are left free to expand, and I have invariably found in consequence of this freedom of expansion, that corns, however long they may have existed in the feet, disappear altogether after a horse has been shod a few times in this manner, and never return while the same plan of shoeing is continued.

I may here observe that the nature of a corn in a horse's

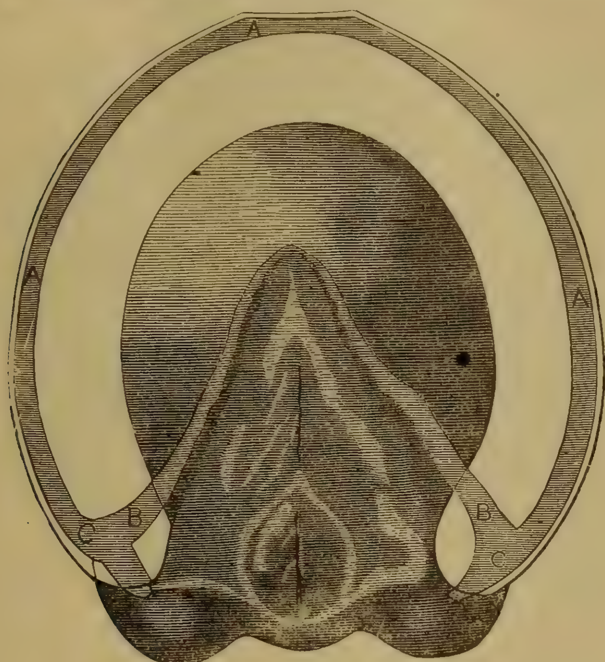


Fig. 14.

foot is very little understood. It is generally supposed to resemble a corn on a man's foot, and like it to be caused by pressure from a shoe, whereas it is a totally different thing, and is caused in a totally different manner. It is a bruise of the sensitive sole which lies above the horny sole, and is not caused by the heel of the shoe at all, but by the heel of the coffin bone which is forced into the hoof by the weight of the horse when in action, and as the hoof from bad shoeing is not able to expand and make room for it, some of the small blood vessels become wounded and the blood which escapes from them filters through the horny

sole and at last shows itself on its under surface at the corner of the inner heel, leading most persons to believe that the bruise began there, whereas in truth it ends there.

SHOEING WITH LEATHER.

Many tender footed horses travel best with a covering over the sole, and leather is commonly used for the purpose. In former editions of my book I recommended gutta percha and waterproofed felt as being far preferable to leather in consequence of their power of resisting wet, and thereby retaining their form under every change of circumstance; but I am sorry to say that the gutta percha of commerce is now so badly adulterated as to be utterly useless for horseshoeing purposes, and waterproofed felt, such as I formerly used, is no longer to be procured. I have endeavored to find some other substitute, but hitherto without success, and I am obliged to submit to using leather in spite of its defects, which are certainly great; for when it is wetted it becomes soft and heavy and yielding, but in drying again it contracts and hardens, causing frequent changes of pressure which are very undesirable qualities in the covering for a horse's frog; still whatever covering you use must be put on the same way, so I will at once tell you how to do it. You must fit the shoe to the foot with as much care as if nothing were to be put under it, and when it is filed up and ready to be put on, lay it with the foot surface downward on the covering whatever it may be, and mark the form of the shoe upon it with the end of the drawing knife, then cut the piece out, put it in its place upon the shoe and fix them both in the vice, which will hold them close together while you carefully cut the edge of the covering until it agrees with the edge of the shoe, then turn them in the vice together so as to bring the heels of the shoe uppermost, and cut out a piece from heel to heel, slightly curved downward in the center that nothing may be left projecting for the ground to lay hold of. The next thing to be done is to smear the whole of the under surface

of the foot with common tar mixed with a little grease, but be sure that you never use gas tar instead of the other, for it dries up the horn and makes it as hard as flint, whereas common tar keeps it moist and tough; then you must fill the hollow between the frog and the crust on both sides with oakum (which is better for the purpose than tow)

Fig. 15.

dipped in the tar, pressing it well into the hollow until the mass rises above the level of the frog on each side, but never put any oakum upon the frog itself excepting a piece in the cleft to prevent the dirt and girt working in; very little is ever wanted on the sole in front of the frog. The use of the oakum is to protect the foot, but more especially the navicular joint, which lies above and across the frog, from being jarred by stones on a hard road, and the best way of doing this is to fill the space on each side of the frog with oakum in such a manner that it shall share the pressure with the frog and prevent the full force of the shock from falling on the navicular joint.

The usual mode of stopping a foot is to place a thick wad of tow over the whole surface of the sole and frog, making bad worse by adding to the projection of the frog, and causing it to meet the ground sooner and receive the full force of the jar.

Fig. 15 shows a foot properly stopped and ready for shoe-

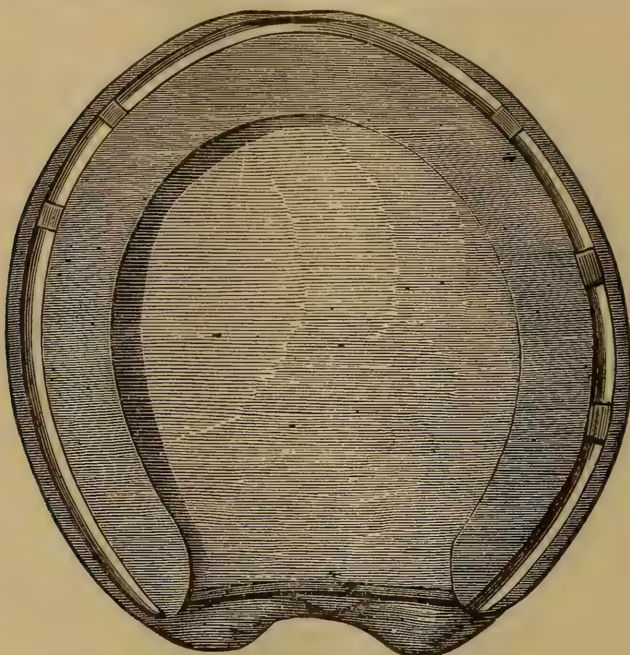


Fig. 16.

ing. The ends of the oakum that is placed in the cleft of the frog, are collected together and carried across the body of the frog, to be mixed with the oakum on one side, which keeps it in its place in the cleft and prevents it working out behind.

You must now nail on the shoe with five nails, exactly as you would do if there was nothing under it, and if you have attended to the fitting there will be no fear of the shoe shifting or coming off.

Fig. 16 shows a foot properly shod with leather, and also the shape to which the leather should be cut between the heels of the shoe.

THE HIND SHOE.

The hind shoe, like the fore shoe, should be brought in at the heels and be made to follow the exact shape of the hoof; but as the weight of the horse falls differently on the hind feet to what it does on the fore feet, and as the rider often obliges the horse to stop suddenly and without warning, when he is least prepared to do so, it becomes necessary to guard against strains of the hock and back sinews by raising the heels of the shoe. but this should be done in such a manner as will give both heels an even bearing on the ground. Calkins may be, and I believe are, useful to heavy draught horses, but they are objectionable for fast work; and turning down the outside heel alone should never be done, it throws the weight upon the inner quarter, which is the least able to bear it, and strains the fetlock joint. The plan I have adopted for many years is to have the last inch and a half toward the heel forged deeper and thicker than any other part of the shoe, the heels are then made red hot and the shoe is put in the vice with the hot heels projecting, which are beaten down with a hammer until they are about an inch long, and then the sides are made even and the foot and ground surfaces level on the anvil. I have found horses travel pleasanter and receive less damage to their hocks, back sinews and fetlock joints with these heels to their hind shoes than they have with any others that I have tried.

The toe of the hind shoe is exposed to great wear, and should be made stout and thick and rather pointed, with a small clip in the middle to prevent the shoe from being driven backward, and the back edge of the web should be rounded off to guard against over reach. The toe should rest fairly on the ground, to enable the horse to get a good purchase for throwing his weight forward. It is a bad plan to make the toe broad and to place clips at the side of it; it is nearly certain to cause the very evil it was intended to prevent, by making the horse "forge" as it is called.

Many persons think that "forging" is caused by the

front of the toe of the hind shoe striking against the heel of the fore shoe, but that is a mistake; the sound is produced in this way: when the horse raises his fore foot from the ground and does not instantly throw it forward but dwells in the action, the hind foot following quickly is forced into the opening of the fore shoe before the fore foot gets out of the way, and the corners of the broad toe, made still broader by the clips at the sides, are struck against the inner rim of the web of the fore shoe on each side just behind the quarters, and cause the unpleasant clicking sound. The way to avoid this disagreeable noise is to make the hind shoe narrow at the toe and rather pointed with a small clip in the center, and to leave the hoof projecting beyond the shoe across the toe; then the projecting horn of the hind foot will enter the opening of the fore shoe held up to receive it, and be stopped by the sole or frog before any part of the two shoes can come together, and the noise will cease.

I have said that you should round off the back edge of

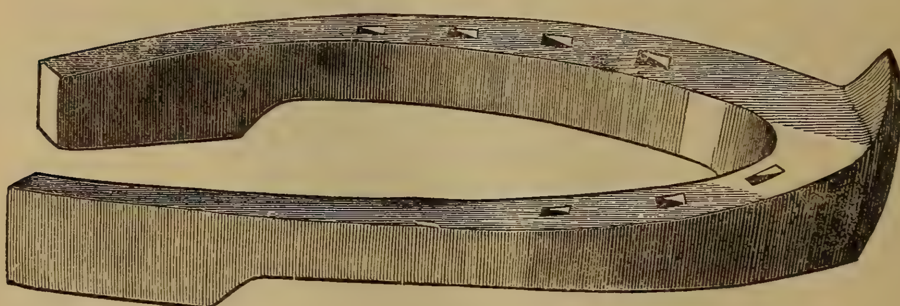


Fig. 17.

the web at the toe to prevent an over reach. It is commonly supposed that this also is done by the front of the toe, whereas it is always done by the back edge, which, in a well worn shoe, becomes as sharp as a knife. Now if the horse in galloping does not lift his fore foot from the ground and throw it forward in time to make way for the hind foot, the hind foot over reaches it and cuts a piece out of the soft parts above the heel and produces a very troublesome wound.

The hind foot expands less than the fore foot, still you should place the nail holes so as not to confine the foot. For some years I shod my light horses as an experiment with only six nails in each hind shoe, and I found it to answer very well for them, but six were not enough to prevent the hind shoes of my large carriage horses from occa-

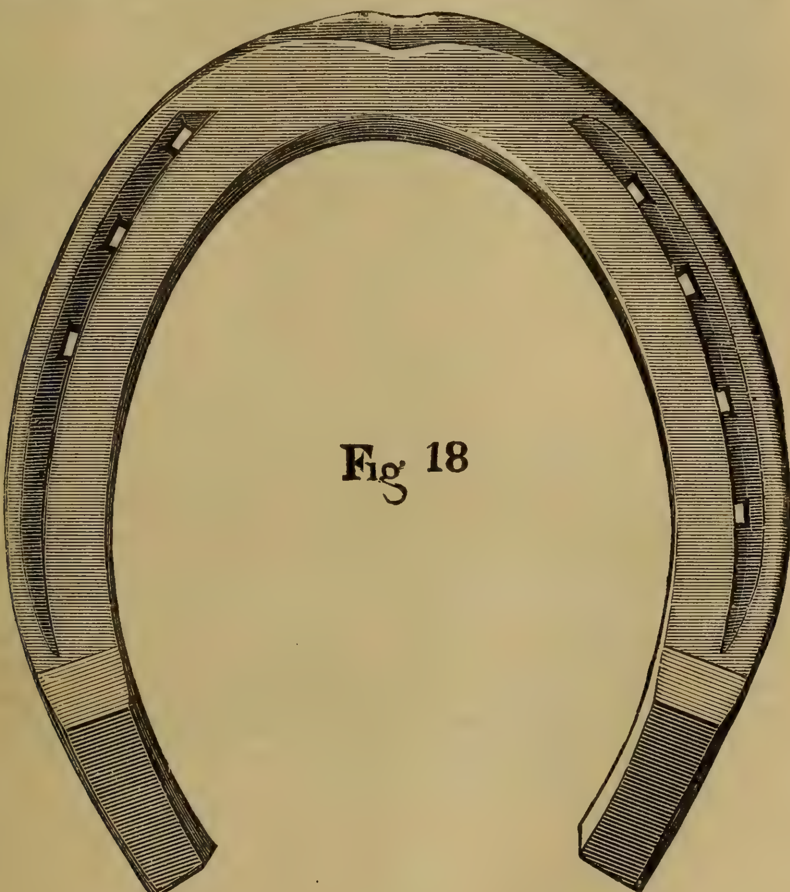


Fig 18

sionally shifting on their feet; I therefore shod them with seven, and I recommend you as a general rule to put seven nails into the hind shoes of all hunters and other horses that are likely to be frequently called upon to exert the muscular powers of their hind quarters to their fullest ex-

tent. The holes on the inside should be stamped closer together than those on the outside, and they should be placed forward toward the toe so as leave the inside quarter and heel free to expand. A small foot can be safely shod with six nails, and no foot can ever require more than seven.

Fig. 17 represents the side view of a near hind shoe with the foot surface uppermost, showing a level portion for the crust to rest upon, the heels being raised in the manner I have described above, and the toe made stout and pointed with a small clip in the center.

Fig. 18 shows the ground surface of a near hind shoe with the toe rather pointed and the back edge rounded, and the nail holes properly placed when the foot is large enough to require seven.

CUTTING.

Horses strike their feet against the opposite leg in such a variety of ways both before and behind, that it is impossible to form a shoe that would suit every case of "cutting;" I therefore advise you, whether the horse cuts before or behind, to fasten something like a boot, covered thickly with wetted pipeclay, over the place where he strikes the leg, and then trot him along the road; he will soon pick off some of the pipeclay with the opposite foot, and show you the exact part of the shoe he strikes with, which you can easily alter in the new shoe; and you will often be surprised to see how small a matter causes the mischief.

REMOVING.

The time at which a horse's shoes should be removed, must depend very much upon circumstances. If a horse wears his shoes out in less than a month, they had better not be removed; and horses with thin, weak horn, which grows slowly, are likewise better left alone between each

shoeing, unless their shoes last seven or eight weeks, in which case they should be removed once within the time; but horses with strong feet, and plenty of horn, that wear their shoes four or five weeks, should have them removed at the end of a fortnight; and when the horses are doing so little work, or wear their shoes so lightly that they last over two months, they should be removed every two or three weeks, and at the second removal the shoes should be put in the fire, and refitted, or the feet will out-grow the shoes, as the horn grows much quicker when a horse is idle than it does when he is in full work.

Having now gone carefully through all the circumstances necessary to good shoeing, and stated the reasons why certain things should *always* be done, and certain other things *never* done, I will repeat shortly the few things which *are to be done*, in the order in which they occur, and you will find that they are really very few, when separated from the reasons and explanations.

Raise the clinches with the buffer.

Have only one foot bare at a time.

Pare out the foot; but leave the frog alone.

Cut off the heels of the shoe, as I have directed.

Open the nail holes *straight* through the shoe.

Form a clip at the toe, and turn up the toe of the shoe.

Fit the shoe with great care to the toe, quarters and heels.

Heat the shoe, and apply it to the foot, to see that the crust has a fair bearing upon it.

Cool the shoe, "back hole" it, and file it up.

Nail it on with five nails, coming out low in the crust.

Hammer down the clinches without rasping them, and only rasp the hoof below them.

GENERAL OBSERVATIONS.

I have said that five nails are sufficient to hold on a fore shoe at any kind of work, in any country and at any pace, and I again advise you to employ that number, placing

three on the outside of the shoe, and two on the inside, because I know from experience that with the very commonest care on the part of the smith, they will hold a shoe through any difficulty of ground or pace, but I am prepared to prove that they are more than sufficient for the purpose, and to show that many smiths can and do keep on a fore shoe by three nails only, two placed on the outside and one on the inside.

For sixteen years I never, in a single instance, had more then three nails in the fore shoe of any one of my six horses, and they have all been shod with leather, or some other covering to the sole during the whole time; some of them did not particularly require it, but having commenced it as an experiment, and finding no inconvenience from it, I have gone on with it, even with a carriage horse, which has grown to rather more than seventeen hands high, and he too has continued to carry his shoes, leather and all, quite safely with only three nails in each fore shoe during the four years that he has been in my possession.

Cases are recorded of horses having done a variety of work with only three nails in each fore shoe; and I will now add another which happened to a horse of my own, which ought to set the question at rest, supposing any doubt still to exist as to the capability of three nails to hold a shoe. The horse was twenty-eight years old at the time; he was a high stepper, and impetuous in company, and had large flat feet which grew horn very sparingly, so that it was quite necessary to protect his feet by a stout shoe with leather and stopping under it. He happened to be a particularly good lady's horse for one who had plenty of nerve and could ride well, and I lent him to join in a large riding party of ladies and gentlemen on a visit at a friend's house, who took long daily rides in a very hilly district regardless of pace, over commons covered with heath, furze and stones, through rough stony lanes and in every variety of ground, and although his shoes had been on ten days when I sent him away he returned to me at the end of five weeks with his shoe worn out certainly, but firm on his feet and the clinches all close. I mention this last circumstance because it is a proof that his shoes had been put on with pro-

per care; for whenever you find a clinch rise you may be certain that you have done something wrong; either the crust did not bear upon the shoe all round or the nail holes did not pass straight through the shoe, or the heads of the nails did not fill the bottom of the holes; any one of these things may cause a clinch to raise, and a risen clinch is a sure sign of careless shoeing.

I may mention as further proof of the sufficiency of three nails to keep on a shoe, that Major General Key, when in command of the 15th Hussars, stationed at Exeter, England, thirteen years ago, had four horses shod with three nails only in each fore shoe. Finding how many horses were shod he was induced to try the plan upon his, and felt so satisfied with the result that he immediately had the others similarly shod; and an officer in the Prussian hussars wrote me that his horses also were shod with three nails only in each fore shoe, and that he found no difficulty whatever in keeping their shoes on.

But in order still further to test the power of three nails to hold a shoe, I obtained permission of a builder to have one of his horses, which was employed in drawing heavy building materials through a deep clay meadow, shod with three nails only in each fore shoe. The horse in question was fifteen hands three and a half inches high, and the shoes that were put on him were common wagon horse shoes with stamped holes and no fullering, and each shoe weighed one pound fourteen ounces, and he carried them safely for a month notwithstanding the heavy loads he daily drew through the deep, clinging clay in which he worked.

I could state several other cases of successful shoeing with three nails if it were necessary, but as I have no intention of recommending you to trust to such slender fastening as your general plan of shoeing, I may content myself with those which I have already recorded; nevertheless I would advise you not to be perfectly satisfied with yourself until you have tried your hand at keeping on some shoes by three nails only; because a bad fitter cannot do it, but a good fitter always can. The principal use of such an experiment will be to show you, that you may safely leave out one or even two nails in a case of broken crust, or a "shaky" place,

or indeed whenever from any cause you may think it desirable to do so.

I think I have proved beyond dispute that a fore shoe can be kept on by three nails, therefore he must be a sorry bungler indeed who cannot manage it with five.

Although I have nothing new to offer, and nothing to alter as regards the principles of Horse Shoeing, which I have endeavored to inculcate in the preceding editions of my book, I considered that it would not be altogether uninteresting to those whose fears still deter them from adopting it, if in putting forth another edition I recorded some few of the confirmatory results of the further experience since the former editions were published, but more especially those derived from the hunting field toward the close of such a season as 1860, marked as it was by an unprecedented quantity of wet, which rendered the country heavier and deeper and more trying to the security of horses' shoes, than any that had preceded it for several years. I found on referring to the register kept at the Devon and Exeter Institution, that the quantity of rain which fell during the three months of November, December, and January of that winter, amounted to 11¼ inches, while the average for the same three months of the preceding five years showed less than half that quantity, the amount being only 5¼ inches.

It may perhaps suffice without enumerating all the horses which had carried their shoes safely through that season with five nails, if I confine my remarks to four belonging to two gentlemen who are both above the average weight, and one of them considerably above the average hight of their compeers; they are both good men across country, ride well to hounds and are always to be found in the best places during a run; one of them had shod his horses on my plan for four or five years, relieving their feet occasionally in the summer by omitting two of the five nails; he therefore had no fears, and was not at all surprised that he had lost no shoes; but the other to whom it was an experiment, showed great misgiving at first, but two or three shoeings convinced him that his fears were groundless, and he has now more confidence in five nails, than he had a year before in seven or eight; because then the loss of a shoe was no uncommon

thing with him, whereas now the thought of such an occurrence never enters his head. The first horse he asked me to see shod for him, is one that has gained for himself a high character in Ireland as a steeple chase horse, and I must say that his legs bore ample testimony to their familiarity with stone walls, they were perfectly round and disfigured by sundry bony lumps; nevertheless his owner had given a large price for him. He is a powerful lasting horse, and is not to be stopped by a six foot wall. When I saw him first he was very badly shod, and had seven nails in each fore shoe, which clearly had a good deal to do with the weak horn and round legs he possessed at that time; for very soon after his feet had been freed from the confinement caused by the inside nails, his legs became less round, although he had been regularly hunted in turn with the other horses; and at the third shoeing the suspensary ligaments could be distinctly traced by the finger, and some weeks afterward when I next saw him shod, they were perfectly visible and his legs had become almost flat; he had moreover a very fair quantity of dead horn in his feet, showing that the growth of horn had begun to increase, which at previous shoeings had been very deficient; and I had no doubt when the hunting season was quite over, that the relief afforded by the withdrawal of two nails, would cause very considerable further improvement both in his legs and feet. But the most satisfactory result of the season was furnished by the other horse belonging to the same gentleman, which he had regularly ridden in turn with the one above mentioned; this horse, although undeniable in the hunting field, had large flat brittle feet, which made riding him in some places rather nervous work, and I recommended his owner to try him with five nails and leather, and after indulging in the expression of numerous doubts and fears he consented, provided I would see it done, which of course I did, and great was his relief at the end of the first day to find that his horse had not only carried him more pleasantly than usual through very deep ground, but that he had brought his shoes home safe and unmoved on his feet; this gave him confidence and he continued to hunt him in leather secured by five nails; and he told me that he verily be-

lieved the horse had scarcely ever been less than fetlock deep during any day he was out in the preceding three months, frequently knee deep, and on the day previous to our conversation he was bogged up to his tail, but he had not lost a shoe and he would not take double the money that he offered to sell him for in the early part of the season.

I will add one other case for the purpose of showing the amount of relief, that was obtained from the removal of one nail from the inner quarter of each fore foot of an old thorough bred hunter, which one of the above named gentlemen had purchased in the early part of the season. He was the very beau ideal of what a weight carrying hunter should be; perfect master of his business and well known in most of the best hunting counties in England; but time and hard work had somewhat told on him, and prevented his recovering the effects of a severe day quite as readily as he used to do in times past. All this my friend was fully prepared for, but he was not prepared for the state in which he found him on the morning after the first severe day he had encountered; and he begged me to come and look at his "poor horse" with him, which I did and it has rarely fallen to my lot to behold a more pitiable object than that poor beast presented; he was standing in the middle of his box apparently unable and most unquestionably unwilling to move; his fore legs slightly separated, to prevent the weight of his forehand falling in a direct line on his feet, and his head and neck considerably lowered for the same purpose. It was at once evident to me that his distress arose from pain in the feet; I asked my friend how he was shod, and he told me that he had not looked at his shoes, thinking they must be all right as he came to him direct from a hunting stable; but I did not feel quite so sure that they were all right, so I examined his hoofs as he stood and found a nail placed far back in the inner quarter of each fore foot; I immediately sent for the smith and had the clinches of the two offending nails cut off, and the nails partly punched out while his feet were still on the ground, but before they could be entirely withdrawn from the shoes, it became necessary to raise each foot which was a difficult matter, for he would have submitted to be pushed over rather than attempt to rest his weight on

one foot only; however, by supporting him well on the other side it was accomplished, and the back nail of each foot removed. I visited him again in about three hours, and I confess I was astonished to find him quietly feeding, and evincing no indisposition to move to either side, or even to turn about when I required him to do so; the character of his expression was changed, and he did not look like the same horse.

On the following morning he was walked out for exercise, and on the second day I saw his old shoes taken off and new ones put on, secured by five nails without his having shown the smallest uneasiness; but when my friend mentioned the circumstance to a gentleman, who had hunted regularly from his boyhood and really knows a great deal about it, he strongly advised him against hunting with only five nails; he said it might do in the stable or at exercise, but it would not do with hounds, My friend, however, took a different view of the matter; for having witnessed the relief which was obtained in so short a time from the removal of those two nails, while the horse was standing still in the stable, he wisely concluded that their presence in the shoes during a severe run must have been very inconvenient, to say the least of it; and he therefore determined to shoe him with only five nails for the future, and never again saw him more distressed on the morning after a hard day, than any other horse would have been under similar circumstances.

YOUATT ON DISEASES OF THE FOOT.

INFLAMMATION OF FOOT—ACUTE FOUNDER

The sensible laminæ, or fleshy plates on the front and sides of the coffin-bone, being replete with blood-vessels, are like every other vascular (filled with blood vessels) part, liable to inflammation, from its usual causes, and particularly from the violence with which, in rapid and long continued action, these parts are strained and bruised. When battered and bruised by severe races or journeys, it will be no wonder if inflammation of the over-worked parts should ensue; and the occurrence of it may probably be produced, and the disease aggravated by the too prevalent absurd mode of treating the animal. If a horse that has been ridden or driven hard is suffered to stand in the cold, or if his feet are washed and not speedily dried, he is very likely to have "fever in the feet." There is no more fruitful source of inflammation in the human being, or the brute, than these sudden changes of temperature. The danger is not confined to change from heat to cold. Sudden transition from cold to heat is as injurious, and therefore it is that so many horses, after having been ridden far in frost and snow, and placed immediately in a hot stable, and littered up to the knees, are attacked by this malady.

Sometimes there is a sudden change of inflammation from one organ to another. A horse may have labored for several days under evident inflammation of the lungs; all at once that will subside, and the disease will appear in the feet, or inflammation of the feet may follow similar affections in the bowels or the eyes. In case of severe inflammation of the lungs, it may not be bad practice to remove the shoes and poultice the feet.

To the attentive observer the symptoms are clearly marked, and yet there is no disease so often overlooked by the groom and the carter, and even by the veterinary surgeon. The disease may assume an acute or chronic form. The earliest symptoms of fever in the feet are fidgetiness, frequent shifting of the fore-legs, but no pawing, much less any attempt to reach the belly with the hind feet. The pulse is quickened, the flanks heaving, the nostrils red, and the horse, by his anxious countenance, and possibly moaning, indicating great pain. Presently he looks about his litter, as if preparing to lie down, but he does not do so immediately ; he continues to shift his weight from foot to foot; he is afraid to draw his feet sufficiently under him for the purpose of lying down; but at length he drops. The circumstance of his lying down at an early period of the disease will sufficiently distinguish inflammation of the feet from that of the lungs, in which the horse obstinately persists in standing until he drops from mere exhaustion. His quietness when down will distinguish it from colic or inflammation of the bowels, in both of which the horse is up and down, and frequently rolling and kicking when down. When the grievance is in the feet, the horse experiences so much relief from getting rid of the weight painfully distending the inflamed and highly sensible laminæ, that he is glad to lie as long as he can. He will likewise, as clearly as in inflammation of the lungs or bowels, point out the seat of disease by looking at the part. His muzzle will often rest on the feet or the affected foot. He must be inattentive who is not aware of what all this indicates.

If the feet are now examined, they will be found evidently hot. The patient will express pain if they are slightly rapped with a hammer, and the artery at the pastern will throb violently. No great time will now pass, if the disease is suffered to pursue its course, before he will be perfectly unable to rise; or, if he is forced to get up, and one foot is lifted, he will stand with difficulty on the other, or perhaps drop at once from intensity of pain.

The treatment will resemble that of other inflammations, (see concluding paragraph under "Chronic Founder,") with such differences as the situation of the disease suggests.

Bleeding is indispensable; and that to its fullest extent. If the disease is confined to the forefeet, four quarts of blood should be taken as soon as possible from the toe of each, and in the manner already described; care being taken to open the artery as well as the vein. The feet may likewise be put into warm water, to quicken the flow of the blood, and increase the quantity abstracted. Poultices of linseed meal made very soft, should cover the whole of the foot and pastern, and be frequently renewed, which will promote evaporation from the neighboring parts, and possibly through the pores of the hoof, and by softening and rendering supple the hoof, will relieve its painful pressure on the swelled and tender parts beneath. More fully to accomplish this last purpose, the shoe should be removed, the sole pared as thin as possible, and the crust, and particularly the quarters, well rasped. All this must be done gently and with a great deal of patience, for the poor animal can scarcely bear his feet to be meddled with. There used to be occasional doubt as to the administration of physic, from fear of metastasis (shifting) of inflammation which has sometimes occurred, and been generally fatal. When, however, there is so much danger of losing the patient from the original attack, we must run the risk of the other. Sedative and cooling medicines should be diligently administered, consisting of digitalis, nitre, and emetic tartar.

If no amendment is observed, three quarts of blood should be taken from each foot on the following day. In extreme cases, a third bleeding of two quarts may be justified, and, instead of the poultice, cloths kept wet with water in which nitre has been dissolved immediately before, and in the proportion of an ounce of nitre to a pound of water, may be wrapped round the feet. About the third day a blister may be tried, taking in the whole of the pastern and the coronet; but a cradle must previously be put on the neck of the horse, and the feet must be covered after the blister, or they will probably be sadly blemished. The horse should be kept on mash diet, unless green meat can be procured for him; and even that should not be given too liberally, nor should he, in the slightest degree, be coaxed to eat. When he appears to be recovering, his getting on his feet should not be

hurried. It should be left perfectly to his own discretion; nor should even walking exercise be permitted until he stands firm on his feet. When that is the case, and the season will permit, two months' run at grass will be very serviceable.

It is not always, however, or often that inflammation of the feet is thus easily subdued; and, if it is subdued, it sometimes leaves after it some fearful consequences. The loss of the hoof is not an unfrequent one About six or seven days from the first attack, a slight separation will begin to appear between the coronet and the hoof. This should be carefully attended to, for the separated horn will never again unite with the parts beneath, but the disunion will extend, and the hoof will be lost. It is true that a new hoof will be formed, but it will be smaller in size, and weaker than the first, and will rarely stand hard work. When this separation is observed, it will be a matter of calculation with the proprietor of the horse whether he will suffer the medical treatment to proceed.

CHRONIC FOUNDER.

This is a species of founder insidious in its attack, and destructive to the horse. It is a milder form of the preceding disease. There is lameness, but it is not so severe as in the former case. The horse stands as usual. The crust is warm, and that warmth is constant, but is not often probably greater than in a state of health. The surest symptom is the action of the animal. It is diametrically opposite to that in the navicular disease. The horse throws as much of his weight as he can on the posterior parts of his feet.

The treatment should be similar to that recommended for the acute disease—blood letting, poultices, fomentations and blisters, and the last much sooner and much more frequently than in the former disease.

PUMICED FEET.

The sensible and horny little plates which were elongated and partially separated during the intensity of the inflammation of founder, will not always perfectly unite again, or will have lost much of their elasticity, and the coffin-bone, no longer fully supported by them, presses upon the sole, and the sole becomes flattened, or convex, from this unnatural weight, and the horse acquires a pumiced foot. This will also happen when the animal is used too soon after an attack of inflammation of the feet, and before the laminæ have regained sufficient strength to support the weight of the horse, or to contract again by their elastic power when they have yielded to the weight. When the coffin-bone is thus thrown on the sole, and renders it pumiced, the crust at the front of the hoof will "*fall in*," leaving a kind of hollow about the middle of it.

Pumiced feet, especially in horses with large, wide feet, are frequently produced without this acute inflammation. Undue work, and especially much battering of the feet on the pavement, will extend and sprain these laminæ so much that they will not have the power to contract, and thus the coffin-bone will be thrown backward on the sole. A very important law of nature will unfortunately be soon active here. When pressure is applied to any part, the absorbents become busy in removing it; so, when the coffin-bone begins to press upon the sole, the sole becomes thin from the increased wear and tear to which it is subjected by contact with the ground, and also because these absorbents are rapidly taking it away.

This is one of the diseases of the feet for which there is no cure. No skill is competent to effect a reunion between the separated fleshy and horny laminæ, or to restore to them the strength and elasticity of which they have been deprived, or to take up that hard, horny substance which speedily fills the space between the crust and the receding coffin-bone.

All that can be done in the way of palliation is by shoeing. Nothing must press on the projecting and pumiced

part. If the projection is not considerable, a thick bar-shoe is the best thing that can be applied; but should this sole have much descended, a shoe with a very wide web, bevelled off so as not to press on the part, may be used. These means of relief, however, are only temporary, the disease will proceed; and at no great distance of time the horse will be useless.

CONTRACTION.

It must be premised that there is a great deal more horror of contracted heels than there is occasion for. Many persons reject a horse at once if the quarters are *wiring in;* but the fact is, that although this is an unnatural form of the hoof, it is slow of growth, and nature kindly makes that provision for the slowly altered form of the hoof which she does in similar cases—she accommodates the parts to the change of form. As the hoof draws in, the parts beneath, and particularly the coffin-bone, and especially the heels of that bone diminish; or, after all, it is more a change of form than of capacity. As the foot lengthens in proportion as it narrows, so does the coffin-bone, and it is as perfectly adjusted as before to the box in which it is placed. Its laminæ are in as intimate and perfect union with those of the crust as before the hoof had begun to change. On this account it is that many horses, with very contracted feet, are perfectly sound, and no horse should be rejected merely because he has contraction. He should undoubtedly be examined more carefully, and with considerable suspicion; but if he has good action, and is otherwise unexceptional, there is no reason that the purchase should not be made. A horse with contracted feet, if he goes sound, is better than another with open but weak heels.

The opinion is perfectly erroneous that contraction is the necessary consequence of shoeing. There can be no doubt that an inflexible iron ring being nailed to the foot prevents, to a very considerable degree, the descent of the sole and

the expansion of the heels below; and it is likewise probable that when the expansion of the heels is prevented, they often begin to contract. But here, as before stated, nature makes provision for the change. Some gentlemen who are careful of their horses have driven them twenty years, and principally over the rough pavement of towns, without a day's lameness. Shoeing may be a necessary evil, but it is not the evil which many speculative persons have supposed it, and, notwithstanding its effects, the foot ordinarily lasts longer than the legs; nay, horsemen tell us that one pair of good feet is worth two pairs of legs.

There is nothing in the appearance of the feet which would enable us to decide when contraction is or is not destructive to the usefulness of the animal; his manner of going, and his capability for work, must be our guides. Lameness usually accompanies the beginning of contraction; it is the invariable attendant on rapid contraction, but it does not always exist when the *wiring in* is slow, or of long standing.

A very excellent writer, particularly when treating of the foot of the horse, Mr. Blaine, has given us a long and correct list of the causes of injurious contraction, and most of them are, fortunately, under the control of the owner of the animal. He places at the head of them, neglect of paring. The hoof is continually growing, the crust is lengthening, and the sole is thickening. This is a provision for the wear and tear of the foot in an unshod state; but when it is protected by a shoe, and none of the horn can be worn away by coming in contact with the ground, and the growth of horn continues, the hoof grows high, and the sole gets thick, and, in consequence of this, the descent of the sole and the expansion of the heels are prevented, and contraction is the result. The smith might lessen, if not prevent the evil, by carefully thinning the sole, and lowering the heels at each shoeing; but the first of these is a matter of considerable labor, and the second could not be done effectually without being accompanied by the first, and, therefore, they are both neglected. Owners should often stand by and see that this is properly done.

Wearing the shoes too long, especially when nails are

placed nearer than they should be to the quarters to make the shoes hold, is another cause of contraction. There is no rule which admits of so little exception as that, once in about every three weeks, the growth of horn which the natural wear of the foot cannot get rid of, should be pared away—the toe should be shortened in most feet—the sole should be thinned, and the heels lowered. Every one who has carefully observed the shape of the horse's foot, must have seen that in proportion to its hight or neglected growth, it contracts and closes round the coronet. A low-heeled horse might have other serious defects, of which it will be our duty to speak, but he has seldom a contracted foot.

Another source of contraction is the want of natural moisture. The hoof of the stable-horse kept from moisture becomes dry and unelastic, and, consequently, is rendered more subject to this disease. Hence the propriety of stopping the feet where there is the least tendency to contraction. The intelligent and careful groom will not omit it a single night. Cowdung, with a small portion of clay to give it consistence, is a common and very good stopping. A better one is a piece of thick felt, cut to the shape of the sole, and soaked in water. The common stopping of tar and grease is peculiarly objectionable, for it closes the pores of the feet, and ultimately increases the dryness and brittleness which it was designed to remedy.

Thrushes aid sometimes in producing contraction, but they are much oftener the consequence than the cause.

The removal of the bars takes away a main impediment to contraction. Their use in assisting the expansion of the foot has been already stated, and should a disposition to contraction be produced by any other cause, the cutting away of the bars would hasten and aggravate the evil; but the loss of the bar would not of itself produce contraction.

The contraction, however, that is connected with permanent lameness, although increased by the circumstances which we have mentioned, usually derives its origin from a different source, and from one that acts violently and suddenly. Inflammation of the little plates covering the cof-

fin-bone is the most usual cause; and a degree of inflammation not sufficiently intense to be characterized as acute founder, but quickly leading to sad results, may, and does spring from causes almost unsuspected. Something may depend upon the breed. Blood-horses are particularly liable to contraction. Not only is the foot naturally small, but it is disposed to become narrower at the heels. On the other hand, the broad, flat foot of the cart-horse is subject to diseases enough, but contraction is seldom one of the number. In horses of equal blood, not a little seems to depend upon the color, and the dark chestnut is proverbially prone to contraction.

Whatever is the cause of that rapid contraction or narrowing of the heels which is accompanied by severe lameness, the symptoms may be easily distinguished. While standing in the stable, the horse will point with, or place forward, the contracted foot; or, if both feet are affected, he will alternately place one before the other. When he is taken out of the stable, his step will be peculiarly short and quick, and the feet will be placed gently and tenderly on the ground, or scarcely lifted from it in the walk or the trot. It would seem as if the slightest irregularity of surface would throw the animal down, and so it threatens to do, for he is constantly tripping and stumbling. If the fore-feet are carefully observed, one or both of them will be narrowed across the quarters and toward the heels. In a few cases, the whole of the foot appears to be contracted and shrunk; but in the majority of instances, while the heels are narrower, the foot is longer. The contraction appears sometimes in both heels: at other times in the inner heel only; or, if both are affected, the inner one is wired in the most, either from the coronet to the base of the foot, or only or principally at the coronet—oftener near the base of the foot—but in most cases the hollow being greatest about mid-way between the coronet and the bottom of the foot. This irregularity on contraction, and uncertainty as to the place of it, prove that it is some internal disorganization, the seat of which varies with the portion of the attachment between the hoof and the foot that was principally strained or injured. In every recent case, the

contracted part will be hotter than the rest of the foot, and the sole will, in the majority of cases, be unnaturally concave.

Of the treatment of contraction attended with lameness, little that is satisfactory can be said. There have been various mechanical contrivances, such as clips of a peculiar form, and a jointed shoe, which, when the foot was softened, was gradually pressed asunder at the heels by a screw; but all have proved of no avail, for the disease speedily returned when the ordinary shoe was again applied to enable the horse to work, and work was required of him.

If the action of the horse is not materially impaired, it is better to let the contraction alone, be it as great as it will. If the contraction has evidently produced considerable lameness, the owner of the horse will have to calculate between his value, if cured, the expense of the cure, and the probability of failure.

The medical treatment should alone be undertaken by a skillful veterinary surgeon, and it will principally consist in abating any inflammation that may exist, by local bleeding and physic, paring the sole to the utmost extent that it will bear; rasping the quarters as deeply as can be, without their being too much weakened, or the coronary ring at all injured thereby; rasping deeply likewise at the toe, and perhaps scoring at the toe. The horse is afterward made to stand during the day in wet clay, placed in one of the stalls. He is at night moved into another stall, and his feet bound up thickly in wet cloths; or he is turned out into wet pasturage, with tips, or, if possible, without them, and his feet are frequently pared out, and the quarters lightly rasped. In five or six months the horn will generally have grown down, when he may be taken up, and shod with shoes unattached by nails on the inner side of the foot, and put to gentle work. The foot will be found very considerably enlarged, and the owner will, perhaps, think that the cure is accomplished. The horse may possibly, for a time, stand very gentle work, and the inner side of the foot being left at liberty, its natural expansive process may be resumed: the internal part of the foot, however, has not been healthily filled up with the expan-

sion of the crust. If that expansion has been effected forward on the quarters, the crust will no longer be in contact with the lengthened and narrowed heels of the coffin-bone. There will not be the natural adhesion and strength, and a very slight cause, or even the very habit of contraction will, in spite of all care and the freedom of the inner quarter, in very many instances, cause the foot to wire in again as badly as before.

THE NAVICULAR JOINT DISEASE.

Many horses with well-formed and open feet become sadly and permanently lame, and veterinary surgeons have been puzzled to discover the cause. The farrier has had his convenient explanation, "the shoulder;" but the scientific practitioner may not have been able to discover an ostensible cause of lameness in the whole limb. There is no one accustomed to horses who does not recollect an instance of this.

Behind and beneath the lower pastern-bone, and behind and above the heel of the coffin-bone, is a small bone called the navicular or shuttle-bone. It is so placed as to strengthen the union between the lower pastern and the coffin-bone, and to enable the flexor tendon, which passes over it in order to be inserted into the bottom of the coffin-bone, to act with more advantage. It forms a kind of joint with that tendon. There is a great deal of weight thrown on the navicular bone, and from the navicular bone on the tendon; and there is a great deal of motion or play between them in the bending and extension of the pasterns.

It is very easy to conceive that, from sudden concussion, or from rapid and overstrained motion, and that, perhaps, after the animal has been some time at rest, and the parts have not adapted themselves for motion, there may be too much play between the bone and the tendon—the delicate membrane which covers the bone, or the cartilage of the bone may be bruised, and inflamed, and destroyed; that all the painful effects of an inflamed and opened joint may en-

sue, and the horse be irrecoverably lame. Numerous dissections have shown that this joint, formed by the tendon and the bone, has been the frequent, and the almost invariable seat of these obscure lamenesses. The membrane covering the cartilage of the bone has been found in an ulcerated state; the cartilage has been ulcerated and eaten away; the bone has become carious or decayed, and bony adhesions have taken place between the navicular and the pastern and the coffin-bones, and this part of the foot has often become completely disorganized and useless. This joint is probably the seat of lameness not only in well-formed feet, but in those which become lame after contraction.

The cure of navicular disease is difficult and uncertain. The first and all-important point is the removal of the inflammation in this very susceptible membrane. Local bleeding, poulticing, and physic will be our principal resources. If there is contraction, this must, if possible, be removed by the means already pointed out. If there is no contraction, it will nevertheless be prudent to get rid of all surrounding pressure, and to unfetter as much as possible the inside heel of the coffin-bone, by paring the sole and rasping the quarters, and using the shoe without nails on the inner quarter, and applying cold poultices to the coronet and the whole of the foot. This is a case, however, which must be turned over to the veterinary surgeon, for he alone, from his knowledge of the anatomy of the foot, and the precise seat of the disease, is competent to treat it. If attacked on its earliest appearance, and before ulceration of the membrane of the joint has taken place, it may be radically cured; but ulceration of the membrane will be with difficulty healed, and decay of the bone will forever remain.

Blistering the coronet will often assist in promoting a cure by diverting the inflammation to another part, and it will materially quicken the growth of the horn. A seton passed through the frog by a skillful operator, and approaching as nearly as possible to the seat of the disease, has been serviceable.

SAND-CRACK

This, as its name imports, is a crack or division of the hoof from above downward, and into which sand and dirt are too apt to insinuate themselves. It is so called because it most frequently occurs in sandy districts, the heat of the sand applied to the feet giving them a disposition to crack. It occurs both in the fore and the hind feet. In the fore feet it is usually found in the inner quarter, but occasionally in the outer quarter, because there is the principal stress or effort toward expansion in the foot, and the inner quarter is weaker than the outer. In the hind feet the crack is almost invariably found in the front, because in the digging of the toe into the ground in the act of drawing, the principal stress is in front.

This is a most serious defect. It indicates a brittleness of the crust, sometimes natural, but oftener the consequence of mismanagement or disease, which, in spite of every means adopted, will probably be the source of future annoyance. On a hoof that has once been thus divided, no dependence can be placed, unless, by great care, the natural suppleness of the horn has been restored and is retained.

Sand-crack may happen in an instant, from a false step or over-exertion, and therefore a horse, although he may spring a sand-crack within an hour after the purchase, cannot be returned on that account.

The crack sometimes does not penetrate through the horn. It then causes no lameness; nevertheless, it must not be neglected. It shows that there is brittleness, which should induce the purchaser to pause; and, if proper means are not taken, it will generally soon penetrate to the quick. It should be pared or rasped fairly out, and, if the paring or rasping has been deep, the foot should be strengthened by a coating of pitch, with coarse tape bound over it, and a second coating of pitch covering this.

If the crack has penetrated through the crust, and lameness has ensued, the case is more serious. It must be carefully examined, in order to ascertain that no dirt or sand has got into it; the edges must be more considerably

thinned, and if any fungus (proud flesh) is beginning to protrude through the crack, and is imprisoned there, it must be destroyed by the application of the butyr (chloride) of antimony. This is preferable to the cautery (hot iron), because the edges of the horn will not be thickened or roughened, and thus become a source of after-irritation. The firing iron must then be run deeply across, above and below the crack; a pledget of dry tow being placed in the crack, in and over it, and the whole bound down as tightly as possible. On the third day the part should be examined, and the caustic again applied, if necessary; but if the crack is dry, and defended by a hard horny crust, the sooner the pitch plaster is put on the better.

The most serious case is, when from tread or neglect, the coronet is divided. The growth of horn proceeds from the coronary ligament, and unless this ligament is sound, the horn will grow down, disunited. The method to be here adopted, is to run the back of the firing iron over the coronet where it is divided. Some inflammation will ensue; and when the scab produced by the cautery peels off, as it will in a few days, the division will be obliterated, and sound and united horn will grow down. When there is sufficient horn above the crack, a horizontal line should be drawn with a firing iron between the sound horn and the crack. The connection between the sound part and the crack will thus be prevented, and the new horn will gradually and safely descend, but the horse should not be used until sufficient horn has grown down fairly to isolate the crack. When the horn is divided at the coronet, it will be five or six months before it will grow fairly down, and not before that, should the animal be used even for ordinary work. When, however, the horn is grown an inch from the coronet, the horse may be turned out—the foot being well defended by the pitch plaster, and that renewed as often as it becomes loose—a bar-shoe being worn, chambered so as not to press upon the hoof immediately under the crack, and that shoe being taken off, the sole pared out, and any bulbous projection of new horn being removed once in every three weeks.

To remedy the undue brittleness of the hoof, there is no

better application than that recommended in page 48, the sole being covered at the same time with the common cow dung or felt stopping.

TREAD AND OVER-REACH.

Under these terms are comprised bruises and wounds of the coronet, inflicted by the other feet.

A tread is said to have taken place when the inside of the coronet of one hind foot is struck by the calkin of the shoe of the other, and a bruised or contused wound is inflicted.

A tread, or wound of the coronet, must never be neglected, lest gravel should insinuate itself into the wound, and form deep ulcerations, called sinuses or pipes, and which constitute quittor. Although some mildly stimulating caustic may be occasionally required, the caustic, too frequently used by farriers, should be carefully avoided, not only lest quittor should be formed, but lest the coronary ligament should be so injured as to be afterward incapable of secreting perfect horn. When properly treated, a tread is seldom productive of much injury. If the dirt is well washed out of it, and a pledget of tow, dipped in Friar's balsam*, bound over the wound, it will, in the majority of cases, speedily heal. Should the bruise be extensive, or the wound deep, a poultice may be applied for one or two days, and then the Friar's balsam, or digestive ointment.† Sometimes a soft tumor will form on the part, which will be quickly brought to suppuration by a poultice; and when the matter has run out, the ulcer will heal by the application of the Friar's balsam, or a weak solution of blue vitriol.

An over-reach is a tread upon the heel of the coronet of the fore foot by the shoe of the corresponding hind foot, and either inflicted by the toe, or by the inner edge of the

*Compound tincture of benzoin.

†Digestive ointment is composed of two ounces of Venice turpentine; yolks of two eggs; one-half ounce of oil of St. Johnswort.

inside of the shoe. The preventive treatment is the bevelling, or rounding off, of the inside edge or rim of the hind shoes. The cure is, the cutting away of the loose parts, the application of Friar's balsam, and protection from the dirt.

Some horses, particularly young ones, overreach so as to strike the toes of the hind shoes against the fore ones, which is termed clinking. Keeping up the head of the horse does something to prevent this; but the smith may do more by shortening the toe of the hind shoes, and having the web broad. When they are too long, they are apt to be torn off; when too narrow, the hind foot may bruise the sole of the fore one, or may be locked fast between the branches of the fore shoe.

FALSE QUARTER.

If the coronary ligament, by which the horn of the crust is secreted, is divided by some cut or bruise, or eaten through by any caustic, there will occasionally be a division in the horn as it grows down, either in the form of a permanent sand-crack, or one portion of the horn overlapping the other. It occasionally follows neglected sand-crack, or it may be the consequence of quittor. This is exteriorly an evident fissure in the horn, and extending from the coronet to the sole, but not always penetrating to the laminæ. It is a very serious defect, and exceedingly difficult to remedy; for occasionally, if the horse is overweighted or hurried on his journey, the fissure will open and bleed, and very serious inconvenience and lameness may ensue. Grit and dirt may insinuate itself into the aperture, and penetrate to the sensible laminæ. Inflammation will almost of necessity be produced, and much mischief will be effected. While the energies of the animal are not severely taxed, he may not experience much inconvenience or pain; but the slightest exertion will cause the fissure to expand, and painful lameness to follow.

The coronary ligament must be restored to its perfect

state, or at least to the discharge of its perfect function. Much danger would attend the application of the caustic in order to effect this. A blister is rarely sufficiently active; but the application, not too severely, of a heated flat or rounded iron to the coronet at the injured part, affords the best chance of success—the edges of the horn on either side of the crack being thinned, the hoof supported, and the separated parts held together by a firm encasement of pitch, as described when speaking of the treatment of sand-crack. The coronet must be examined at least once in every fortnight, in order to ascertain whether the desired union has taken place; and, as a palliative during the treatment of the case, or if the treatment should be unsuccessful, a bar-shoe may be used, and care taken that there be no bearing at or immediately under the separation of the horn. This will be best effected when the crust is thick and the quarters strong, by paring off a little of the bottom of the crust at the part, so that it will not touch the shoe; but if the foot is weak, an indentation or hollow should be made in the shoe Strain or concussion on the immediate part will thus be avoided, and, in sudden or violent exertion, the crack will not be so likely to extend upward to the coronet, when the whole and sound horn has begun to be formed there.

QUITTOR.

This has been described as being the result of neglected or bad tread or over-reach; but it may be the consequence of any wound in the foot, and in any part of the foot. In the natural process of ulceration, matter is thrown out from the wound. It precedes the actual healing of the part. The matter which is secreted in wounds of the foot is usually pent up there, and, increasing in quantity, and urging its way in every direction, it forces the little fleshy plates of the coffin-bone from the horny ones of the crust, or the horny sole from the fleshy sole, or even eats deeply into the internal parts of the foot. These pipes or sinuses

run in every direction, and constitute the essence of the quittor.

If it arises from a wound in the bottom of the foot, the aperture may speedily close up, and the matter which continues to be secreted is confined within, separating the horny from the fleshy sole, until it forces its way upward and appears at the coronet (usually at the quarter), and there slowly oozes out. The opening and the quantity of matter discharged are so small, that although over a great part of the quarter and the sole the horn may have separated from the coffin-bone, and the matter may have penetrated even under the cartilages and ligaments, and into the coffin-joint, but little mischief would be suspected by an inexperienced person. The pressure of the matter wherever it has gone, has formed ulcerations that are indisposed to heal, and that require the application of strong and painful stimulants to induce them to heal; and, worse than this, the horn, once separated from the sensible parts beneath, will never again unite with them. Quittor may occur in both the fore and the hind feet.

It may be necessary to remove much of the horny sole, which will be speedily reproduced when the fleshy surface beneath can be brought to a healthy condition; but if much of the horn at the quarters must be taken away, five or six months may probably elapse before it will be sufficiently grown down again to render the horse useful.

Measures of considerable severity are indispensable. The application of some caustic wlll alone produce a healthy action on the ulcerated surfaces; but on the ground of interest and of humanity, we protest against that brutal practice, or at least the extent to which it is carried, and is pursued by many ignorant smiths, of coring out, or deeply destroying the healthy as well as the diseased parts—and parts which no process will again restore. When any portion of the bone can be felt by the probe, the chances of success are diminished, and the owner and the operator should pause. When the joints are exposed, the case is hopeless, although, in a great many instances, the bones and the joints are exposed by the remedy and not by the disease. One hint may not be necessary to the practi-

tioner, but it may guide the determination and hopes of the owner ; if, when a probe is introduced into the fistulous on the coronet—the direction of the sinuses or pipes is backward—there is much probability that a perfect cure may be effected ; but if the direction of the sinuses is forward, the cure is at best doubtful. In the first instance, there is neither bone nor joint to be injured ; in the other, the more important parts of the foot are in danger, and the principal action and concussion are found.

Neglected bruises of the sole sometimes lay the foundation for quittor. When the foot is flat, it is very liable to be bruised if the horse is ridden fast over a rough and stony road ; or a small stone, insinuating itself between the shoe and the sole, or confined by the curvature of the shoe, will frequently lame the horse. The heat and tenderness of the part, the occasional redness of the horn, and the absence of puncture, will clearly mark the bruise. The sole must then be thinned, and particularly over the bruised part, and, in neglected cases, it must be pared even to the quick, in order to ascertain whether the inflammation has run on to suppuration. Bleeding at the toe will be clearly indicated ; and poultices, and such other means as have either been described under "Inflammation of the Feet," or will be pointed out under the next head. The principal causes of bruises of the foot are leaving the sole too much exposed by means of a narrow-webbed shoe, or the smith paring out the sole too closely, or the pressure of the shoe on the sole, or the introduction of gravel or stone between the shoe and the sole.

The author subjoins the mode of cure in this disease as it has been practised by two veterinary surgeons. They are both excellent, and, so far as can well be the case, satisfactory.

Mr. Percival says : "The ordinary mode of cure consists in the introduction of caustic into the sinus ; and so long as the cartilage preserves its integrity—by which I mean, is free from decay—this is perhaps the most prompt and effectual mode of proceeding. The farrier's practice is to mix about half a drachm of corrosive sublimate in powder with twice or thrice the quantity of flour, and make

them into a paste with water. This he takes up by little at a time with the point of his probe, and works it about into the sinus until the paste appears rising in the orifice above. After this is done, he commonly has the horse walked about for an hour or two, or even sent to slow work again, which produces a still more effectual solution of the caustic. at the same time that it tends greatly to its uniform and thorough diffusion into every recess and winding of the sinus. The consequence of this sharp caustic dressing is a general slough from the sinus. Every part of its interior surface is destroyed, and the dead particles become agglutinated, and cast off along with the discharges in the form of a dark, firm curdled mass, which the farrier calls the core; and so it commonly proves, for granulations follow close behind it, and fill up the sinus."

The other mode of treatment is that of Mr. Newport, a surgeon of long standing: "After the shoe has been removed, thin the sole until it will yield to the pressure of the thumb; then cut the under parts of the wall in an oblique direction from the heel to the anterior part, immediately under the seat of complaint, and only as far as it extends, and rasp the side of the wall thin enough to give way to the pressure of the over-distended parts, and put on a bar-shoe rather elevated from the frog. Ascertain with a probe the direction of the sinuses, and introduce into them a saturated solution of sulphate of zinc, by means of a small syringe. Place over this dressing the common poultice, or the turpentine ointment, and renew the application every twenty-four hours. I have frequently found three or four such applications complete a cure. I should recommend that when the probe is introduced, in order to ascertain the progress of cure, that it be gently and carefully used, otherwise it may break down the new-formed lymph. I have found the solution very valuable where the synovial fluid (joint-oil) has escaped, but not to be if the inflammation of the parts is great.

PRICK OR WOUND IN THE SOLE OR CRUST.

This is the most frequent cause of quittor. It is evident that the sole is very liable to be wounded by nails, pieces of glass, or even sharp flints. Every part of the foot is subject to injuries of this description, The usual place at which these wounds are found, is in the hollow between the bars and the frog, or in the frog itself. In the fore-feet the injury will be generally recognized on the inner quarter, and on the hind-feet near the toe. In fact, these are the thinnest parts of the fore and hind-feet. Much more frequently the laminæ are wounded by the nail in shoeing; or if the nail does not penetrate through the internal surface of the crust, it is driven so close to it that it presses upon the fleshy parts beneath, and causes irritation and inflammation, and at length ulceration. When a horse becomes suddenly lame after the legs have been carefully examined, and no cause of lameness appears in them, the shoe should be taken off. In many cases the offending substance will be immediately detected, or the additional heat felt in some part of the foot will point out the seat of injury; or, if the crust is rapped with the hammer all round, the flinching of the horse will discover it; or pressure with the pincers will render it evident.

When the shoe is removed for this examination, the smith should never be permitted to wrench it off, but each nail should be drawn separately, and examined as it is drawn, when some moisture appearing upon it will not unfrequently reveal the spot at which matter has been thrown out.

Sudden lameness occurring within two or three days after the horse has been shod, will lead to the suspicion that the smith has been in fault; yet no one who considers the thinness of the crust, and the difficulty of shoeing many feet, will blame him for sometimes pricking the animal. His fault will consist in concealing or denying that of which he will almost always be aware at the time of shoeing, from the flinching of the horse, or the dead sound, or the peculiar resistance that may be noticed in the driving of thenail.

When the seat of mischief is ascertained, the sole should be thinned round it, and at the nail-hole or the puncture, it should be pared to the quick. The escape of some matter will now probably tell the nature of the injury, and remove its consequences. If it be puncture of the sole effected by some nail, or any similar body, picked up on the road, all that will be necessary is to enlarge the opening a little, and then to place on it a fledget of tow dipped in Friar's balsam, and over that a little common stopping. If there is much heat and lameness, a poultice should be applied.

A puncture near the center of the sole is most dangerous, from its liability to wound the flexor tendon where it is inserted in the coffin-bone, from which much action is required; or it may even penetrate the joint between the navicular and coffin-bone.

If pricked by a nail, the treatment above described will usually soon effect a cure. It may, however, be prudent to keep the foot stopped for a few days. If the accident has been neglected, and matter begins to be formed, and to be pent up, and to press on the neighboring parts, and the horse evidently suffers extreme pain, and is sometimes scarcely able to put his foot to the ground, and much matter is poured out when the opening is enlarged, further precautions must be adopted. The fact must be recollected that the living and dead horn will never unite, and every portion of the horny sole that has separated from the fleshy sole above must be removed. The separation must be followed as far as it reaches. Much of the success of the treatment depends on this. No small strip or edge of separated horn must be suffered to press upon any part of the wound. The exposed fleshy sole must then be touched, but not too severely, with the butyr (chloride) of antimony, some soft and dry tow being spread on the part, the foot stopped, and a poultice placed over all if the foot seems to require it. On the following day a thin pellicle of horn will frequently be found over a part or the whole of the wound. This should be, yet very lightly, again touched with the caustic; but if there is an appearance of fungus sprouting from the exposed surface, the application of the butyr must be more severe, the tow being again placed

over it, so as to afford considerable yet uniform pressure. Many days do not often elapse before the new horn covers the whole of the wound. In these extensive openings the Friar's balsam will not always be successful, but the cure must be effected by the judicious and never too severe use of the caustic. Bleeding at the toe and physic will be resorted to as useful auxiliaries when much inflammation arises.

CORNS.

In the angle between the bars and the quarters the horn of the sole has sometimes a red appearance, and is more spongy and softer than at any other part. The horse flinches when this portion of the horn is pressed upon, and occasional or permanent lameness is produced. This disease of the foot is termed corns: bearing this resemblance to the corn of the human being, that it is produced by pressure, and is a cause of lameness. When corns are neglected, so much inflammation is produced in that part of the sensible sole, that suppuration follows, and to that quittor succeeds, and the matter either undermines the horny sole, or is discharged at the coronet.

The pressure hereby produced manifests itself in various ways. When the foot becomes contracted, the part of the sole inclosed between the external crust that is wiring in, and the bars that are opposing that contraction, is placed in a kind of vice, and becomes inflamed; hence it is rare to see a contracted foot without corns. When the shoe is suffered to remain on too long, it becomes embedded in the heel of the foot; the external crust grows down on the outside of it, and the bearing is thrown on this angular portion of the sole. No part of the sole can bear continued pressure, and inflammation and corns are the result. From the length of wear, the shoe sometimes becomes loosened at the heels, and gravel insinuates itself between the shoe and the crust, and accumulates in this angle, and sometimes seriously wounds it.

The bars are too frequently cut away, and then the heel of the shoe must be beveled inward, in order to answer to this absurd and injurious shaping of the foot. By this slanting direction of the heel of the shoe inward, an unnatural disposition to contraction is given, and the sole must suffer in two ways—in being pressed upon by the shoe, and squeezed between the outer crust and the external portion of the bar. The shoe is often made unnecessarily narrow at the heels, by which this angle, seemingly less disposed to bear pressure than any other part of the foot, is exposed to accidental bruises. If, in the paring out of the foot, the smith should leave the bars prominent, he too frequently neglects to pare away the horn in the angle between the bars and the external crust; or if he cuts away the bars, he scarcely touches the horn at this point; and thus, before the horse has been shod a fortnight, the shoe rests on this angle, and produces corns. The use of a shoe for the fore-feet, thickened at the heels, is, and especially in weak feet, a source of corns, from the undue bearing there is on the heels, and the concussion to which they are subject.

Corns are most frequent and serious in horses with thin horn and flat soles, and low, weak heels. They do not often occur in the outside heel. It is of a stronger construction than the inside one. The method adopted by shoeing-smiths to ascertain the existence of corn by the pain evinced when they pinch the bar and crust with their irons, is very fallacious. If the horn is naturally thin, the horse will shrink under no great pressure, although he has no corn, and occasionally the bars are so strong as not to give way under any pressure.

The cure of old corns is difficult; for as all the shoeing has some tendency to produce pressure here, the habit of throwing out this diseased horn is difficult to get rid of when once contracted; recent corns, however, will yield to good shoeing.

The first thing to be done is to well pare out the angle between the crust and the bars. Two objects are answered by this: the extent of the disease will be ascertained, and one cause of it removed. A very small drawing-knife must be used for this purpose. The corn must be pared out to

the very bottom, taking care not to wound the sole. It may then be discovered whether there is any effusion of blood or matter underneath. If this is suspected, an opening must be made through the horn, the matter evacuated, the separated horn taken away, the course and extent of the sinuses explored, and the treatment recommended for quittor adopted. Should there be no collection of fluid, the butyr of antimony should be applied over the whole extent of the corn, after the horn has been thinned as closely as possible. The object of this is to stimulate the sole to throw out more healthy horn. In bad cases a bar-shoe may be put on, so chambered that there shall be no pressure on the diseased part. This may be worn for one or two shoeings, but not constantly, for there are few frogs that would bear the constant pressure of the bar-shoe; and the want of pressure on the heel generally occasioned by their use, would produce a softened and bulbous state of the heels, that would of itself be an inevitable source of lameness.

The cause of corn is a most important subject of inquiry, and which a careful examination of the foot and the shoe will easily discover. The cause being ascertained, the effect may, to a great extent, be afterward removed. Turning out to grass, after the horn is a little grown, first with a bar-shoe, and afterward with the shoe fettered on one side, or with tips, will often be serviceable. A horse that has once had corns to any considerable extent, should, at every shoeing, have the seat of the corn well pared out, and the butyr of antimony applied. The seated shoe should be used, with a web sufficiently thick to cover the place of the corn, and extending as far back as it can be made to do without injury to the frog.

Low, weak heels should be rarely touched with the knife, or anything more be done to them than lightly to rasp them, in order to give them a level surface. Where corns exist of any consequence, they are a disgrace to the smith, the groom, and to the owner.

THRUSH.

This is a discharge of offensive matter from the cleft of the frog. It is inflammation of the lower surface of the sensible frog, and during which pus is secreted together with or instead of horn. When the frog is in its sound state, the cleft sinks but a little way into it; but when it becomes contracted or otherwise diseased, it extends in length, and penetrates even to the sensible horn within, and through this unnaturally deepened fissure the thrushy discharge proceeds. A very full and fleshy state of the body may be a predisposing cause of thrush, but the immediate and grand cause is moisture. This should never be forgotten, for it will lead a great way toward the proper treatment of the disease. If the feet are habitually covered with any moist application—his standing so much on his own dung is a fair example—thrush will inevitably appear. It is caused by anything that interferes with the healthy structure and action of the frog. We find it in the hinder feet oftener and worse than in the fore, because in our stable management the hinder feet are too much exposed to the pernicious effects of the dung and the urine, moistening, or, as it were, macerating, and at the same time irritating them.

In the fore-feet, thrushes are usually connected with contraction. We have stated that they are both the cause and the effect of contraction. The pressure on the frog from the wiring in of the heels will produce pain and inflammation; and the inflammation, by the increased heat and suspended function of the part, will dispose to contraction. Horses of all ages, and in almost all situations, are subject to thrush. The unshod colt is frequently thus diseased.

Thrushes are not always accompanied by lameness. In a great many cases the appearance of the foot is scarcely or not at all altered, and the disease can only be detected by close examination, or the peculiar smell of the discharge. The frog may not appear to be rendered in the slightest degree tender by it, and therefore the horse may not be

considered by many as unsound. Every disease, however, should be considered as legal unsoundness, and especially a disease which, although not attended with present detriment, must not be neglected, for it will eventually injure and lame the horse.

The progress of a neglected thrush, although sometimes slow, is sure. The frog begins to contract in size—it becomes rough, ragged, brittle, tender—the discharge is more copious and more offensive—the horn gradually disappears—a mass of hardened mucus usurps its place—this easily peels off, and the sensible frog remains exposed—the horse cannot bear it to be touched—fungous granulations spring from it—they spread around—the sole becomes under-run, and canker steals over the greater part of the foot.

If a young colt, fat and full of blood, has a bad thrush, with much discharge, it will be prudent to accompany the attempt at cure by a dose of physic, or a course of diuretics. A few diuretics may not be injurious when we are endeavoring to dry up thrush in older horses.

There are many recipes to stop a running thrush. Almost every application of an astringent, but not of the too caustic nature, will have the effect. The common Ægyptiacum (vinegar boiled with honey and verdigris) is a good liniment; but the most effectual and the safest—drying up the discharge speedily, but not suddenly—is a paste composed of blue vitriol, tar and lard, in proportions according to the virulence of the canker. A pledget of tow, covered with it, should be introduced as deeply as possible, yet without force, into the cleft of the frog every night, and removed in the morning before the horse goes to work. Attention should at the same time, as in other diseases of the foot, be paid to the apparent cause of the complaint, and that cause should be carefully obviated or removed. Before the application of the paste, the frog should be examined, and every loose part of the horn or hardened discharge removed; and if much of the frog is then exposed, a larger and wider piece of tow, covered with the paste, may be placed over it, in addition to the pledget introduced into the cleft of the frog. It will be necessary to preserve the frog moist while the cure is in progress, and this may be done

by filling the feet with tow, covered by common stopping, or using the felt pad, likewise covered with it. Turning out would be prejudicial rather than of benefit to thrushy feet, except the dressing is continued, and the feet defended from moisture.

CANKER

Is a separation of the horn from the sensible part of the foot, and the sprouting of the fungous matter (proud flesh) instead of it, occupying a portion or even the whole of the sole and frog. It is the occasional consequence of bruise, puncture, corn, quittor and thrush, and is exceedingly difficult to cure. It is more frequently the consequence of neglected thrush than of any other disease of the foot, or rather it is thrush involving the frog, the bars and the sole, and making the foot in one mass of rank putrefaction.

It is often found in, and is almost peculiar to, the heavy breed of cart-horses, and partly resulting from constitutional predisposition. Horses with white legs and thick skins, and much hair upon their legs—the very character of many dray-horses—are subject to canker, especially if they have an attack of grease, or their heels are habitually thick and greasy. The disposition to canker is certainly hereditary.

Although canker is a disease most difficult to remove, it is easily prevented. Attention to the punctures to which these heavy horses, with their clubbed feet and brittle hoofs, are more than any others subject in shoeing, and to the bruises and treads on the coronet, to which, from their awkwardness and weight, they are so liable, and the greasy heels which a very slight degree of negligence will produce in them, and the stopping of the thrushes, which are so apt in them to run on to the separation of the horn from the sensible frog, will most materially lessen the number of cankered feet.

The cure of canker is the business of the veterinary surgeon, and a most painful and tedious business it is. The

principles on which he proceeds are, first of all, to remove the extraneous fungous growth; and for this purpose he will need the aid of the knife and the caustic, or the cautery, for he should cut away every portion of horn which is in the slightest degree separated from the sensible parts beneath. He will have to discourage the growth of fresh fungus, and to bring the foot into that state in which it will again secrete healthy horn. A slight and daily application of the chloride of antimony, and that not where the new horn is forming, but on the surface which continues to be diseased, and accompanied by as firm but equal pressure as can be made—the careful avoidance of the slightest degree of moisture—the horse being exercised or worked in the mill, or wherever the foot will not be exposed to wet, and that exercise adopted as early as possible, and even from the beginning, if the malady is confined to the sole and frog—these means will succeed, if the disease is capable of cure. It is proper to resort to neurotomy, if the means of cure are persisted in. Medicine is not of much avail in the cure of canker, but as it sometimes alternates with other diseases, a course of alternatives or diuretics may be administered, when the cure is nearly completed.

OSSIFICATION OF THE CARTILAGES.

The cartilages embedded in the heels of the feet from bruises, sprains, etc., are subject to inflammation, and the result of that inflammation is that the cartilages are absorbed, and bone substituted in their stead. This is common in heavy draught-horses, particularly as they are used on paved streets.

No evident inflammation of the foot, or great, or perhaps even perceptible lameness, accompanies this change; a mere slight degree of stiffness may have been observed, which, in a horse of more rapid pace, would have been lameness. Even when the change is completed, there is not in many cases anything more than a slight increase of stiffness, little or not at all interfering with the usefulness

of the horse. When this altered structure appears in the lighter horse, the lameness is more decided, and means should be taken to arrest the progress of the change. These are blisters or firing; but, after the parts have become bony, no operation will restore the cartilage. Some benefit, however, will be derived from the use of leather soles. Advantage has resulted from bar shoes in conjunction with leather.

Connected with ringbone the lameness may be very great.

WEAKNESS OF THE FOOT.

This is more accurately a bad formation than a disease; often, indeed, the result of disease, but in many instances the natural construction of the foot. The term weak foot is familiar to every horseman, and the consequence is too severely felt by all who have to do with horses. In the slanting of the crust from the coronet to the toe, a less angle is almost invariably formed, amounting probably to not more than forty instead of forty-five degrees; and, after the horse has been worked for one or two years the line is not straight, but a little indented or hollow, midway between the coronet and the toe. This has been described as the accompaniment of pumiced feet, but it is often seen in weak feet, that, although they might become pumiced by severity of work, do not otherwise have the sole convex. The crust is not only less oblique than it ought to be, but it has not the smooth even appearance of the good foot. The surface is sometimes irregularly roughened, but it is much oftener roughened in circles or rings. The form of the crust likewise presents too much the appearance of a cone; the bottom of the foot is unnaturally wide in proportion to the coronet; and the whole of the foot is generally but not always larger than it should be.

When the foot is lifted, it will often present a round and circular appearance, with a fullness of frog, and would mislead the inexperienced, and indeed be considered as almost the perfection of structure; but, being examined more

closely, many glaring defects will be seen. The sole is flat, and the smith finds that it will bear little or no paring. The bars are small in size. They are not cut away by the smith, but they can be scarcely said to have any existence. The heels are low, so low that the very coronet seems almost to touch the ground; and the crust, if examined, appears scarcely thick enough to hold the nails.

Horses with these feet can never stand much work. They will be subject to corns, to bruises of the sole, to convexity of the sole, to punctures in nailing, to breaking away of the crust, to inflammation of the foot, and to sprain and injury of the pastern and the fetlock and the flexor tendon.

These feet admit of little improvement. Shoeing as seldom as may be, and with a light yet wide concave web; little or no paring at the time of shoeing, and as little violent work as possible, and especially on rough roads, may protract for a long period the evil day, but he who buys a horse with these feet will sooner or later have cause to repent his bargain.

NOTE.—*Mode of Repairing Horses' Feet.*—Horses which stand nearly or quite the year round, sometimes from year to year in the stable, are apt to have the feet get into a dry and fevered condition; the hoof becomes dry, hard, and often contracted, frequently also very brittle, and the horse sometimes suffers lameness in consequence. Now one of the most effective means of remedying these difficulties, where the horse cannot be spared to be turned into pasture for quite a season, is in the spring, when the ground is breaking up, and the winter's frost disappearing, and no lasting freeze is to be apprehended, to have all of the shoes taken off and drive the horse daily about business, as usual, without them. The roads remain muddy and soft, usually, so that a horse may be thus driven daily for a period of three or four weeks, and a great improvement is effected in the feet in every respect. I have had a horse whose feet were fevered, hoof contracted, hard and brittle, thoroughly renovated or cured by a season of such usage. When the ground becomes hard, and the feet become too tender to drive longer, then have the shoes put on. This treatment of course would not be applicable on pavements, but throughout the country in all the northern states, it is. Although daily driving a horse, in the practice of medicine, of late years, I have never had shoes put on the hind feet except in the frozen part of the year, and the expense of shoeing is not only saved, but I find the horse equally as useful, and the feet all the better for the practice.—MEDICA, in Moore's Rural New Yorker.

SOAP MAKING.

WASHING FLUIDS, ETC.

WHAT SOAP IS AND HOW TO TEST IT.

Family soaps are made of grease and alkali. They are "cold made" or "boiled." "Cold made" soaps are compounds of grease and alkali, produced wholly by mechanical agencies. The elements are poured into vats and stirred until the grease is apparently, but, in point of fact, never saponified. To accomplish this partial saponification, an excess of alkali is necessary. When, therefore, this soap is dissolved in the wash-tub, this excess of alkali not only dissolves the dirt on the clothes, and makes washing easier, but it also attacks the fabric and "rots" it.

Boiled soaps are also made of grease and alkali. These are placed into large vats in proper proportions, and are thoroughly boiled. Under the influence of heat, a much less quantity of alkali is required to produce perfect saponification. After this saponification has taken place, the compound is allowed to cool in the vat. The pure soap rises to the top, and all the impurities settle to the bottom. The value of boiled soaps of course depends greatly on the quality of the materials used. This accounts for the difference in price and quality. The purest materials, such as clean tallow or pure oils, thoroughly saponified, yield the most valuable soaps, costing more per pound, but they are cheaper in the end. A good soap is a perfectly neutral compound, and will in no case injure the most delicate fabrics. The simplest

method of testing soap is by tasting. If it is sharp and biting on the tongue, there is an excess of alkali ; but if it leaves no unpleasant sensation on the tongue, there is not the least danger that it will rot or otherwise injure clothes in washing.

ADULTERATION OF SOAP.

Soap, in the popular sense, is a combination of fat with an alkaline lye, that is, the solution of caustic soda or potash in certain proportions, which, when properly manipulated, produces either a soft or a hard soap, both being employed in domestic economy. The fat is decomposed by proper contact with the alkali, which has the property of removing the glycerine combined in the fat, and to take its place in the remaining constituents of the fatty matter, while the glycerine so displaced is retained in the watery liquid remaining after the separation of the soap from the underlying liquid. Fats are always a combination of glycerine with fatty acids, and when an alkali is brought in proper contact with the fatty matter, the glycerine of the fat is disengaged, and the alkaline lye then combines with the fatty acids, and forms a saponaceous salt commonly known as soap ; as, for example : a stearate of soda, when tallow is made to combine with caustic soda. In other words, tallow is changed into stearic acid, having lost its glycerine, and uniting with the soda, is transformed into a stearate of soda. Stearic acid is not the only constituent of fat. It is there combined with other similar acids, as the margaric and oleic acids ; but in tallow the stearic is the most abundant, while in lard, margaric acid predominates, and oleic acid in the fatty oil of commerce.

Potash produces, in its caustic state, the same kind of alteration as caustic soda. When potash is used, the fatty acids combine with it, and form stearates, margarates or oleates of potash. One peculiarity, however, of potash, is that its use produces soaps less consistent or

hard in their nature than soda; but in order to diminish the hardness of some soda soap, some potash is used in their manufacture and conversely soda, in some form, is also used to modify the soft tendency of pure potash soaps, when it is desirable to have them in condition to be transformed into bar soap.

Potash is mostly obtained from the ashes of hard woods, which, being leached, yield a crude potash by evaporation of the water in iron boilers. It is also obtained from felspar, a mineral found in various localities, containing it in combination with alkaline earths or salts, from which it is separated by chemical processes for the purposes of commerce and manufactures.

Soda is obtained from the ashes of various kinds of sea-weeds, which, being burned into ashes, are leached as the ashes of hard wood, and the resulting product is soda ash or barilla, an impure kind of soda which, however, is further purified, and rendered caustic for the purposes of soap-making. This has been, till a comparatively recent period, the chief source of supply of the soda of commerce. But with increased wants bountiful Providence has provided other sources of supply to mankind. In common salt, a compound of soda with chlorine, is found an illimitable supply. By a series of chemical processes, chlorine is set free, and soda, in the form of sal-soda, and also in the state of caustic soda, is obtained, both in great use in many arts and manufactures.

Again another source of supply has been recently discovered in a mineral substance named kryolite, found abundantly in Greenland. Soda is combined in it with an oxide of aluminum, a pure clay, which being separated from their combination by chemical art, enables us to apply them to their respective uses.

HOW SOAP IS MADE IN GENERAL.

Animal fat, such as tallow, is the substance most at hand of all other fatty matters for soap-making, al-

though vegetable oils, such as palm, cocoa-nut, castor, sunflower, olive and other oils, and also rosin, are used in soap-making occasionally, but tallow being more easily obtainable, and generally at a lower cost than most of the oils above enumerated, is most extensively employed in the manufacture of domestic soap. For this purpose, after being freed of skin by boiling, straining and remelting, it is heated to the temperature of boiling water, and mixed on the fire with a hot solution of either soda, potash, or both, in water called the lye ; the whole is gradually transferred into an iron pot, larger by at least one-third than the whole mixture, about one quart of the melted fat being first ladled into it, then as much or more of the hot lye, the mixture constantly stirred on the fire till a sort of creamy matter is formed, the ladling kept on alternately till all the lye and fat are mixed together ; the stirring to be kept up on a moderate fire till the mixture boils, and is allowed to boil some ten or fifteen minutes, according to the strength of the lye employed ; it is then transferred from the boiler into a form, a tight box, in which muslin has been placed overhanging the box, so that the soap may be afterward more easily drawn out of it for the purpose of drying it, or else it may be poured in a common wash-tub, previously soaked in water to prevent adhesion to the tub, and there allowed to harden for a few days, from whence it is transferred on boards, or upon a table to dry and be cut in bars for use, by means of an annealed wire.

SOAP FROM HOME-MADE CAUSTIC SODA.

It sometimes happens that caustic soda is not within reach, and yet sal-soda is to be had. To transform this material into a suitable lye for soap-making, this is a convenient and suitable process : Dissolve sal-soda, say three pounds, in two gallons of warm water. Slack in a firkin three pounds of good quicklime * ; add to it the

* Quicklime added to common soda (the carbonate) makes caustic soda.

soda solution ; stir the whole thoroughly with a stick, and add two gallons of boiling water ; stir again, and let it settle. Pour off the clear liquor in a clean iron boiler placed on the fire, and stir into it six pounds of clarified grease, and two ounces of powdered borax. Let it boil slowly till it gets thick and ropy (about ten minutes boiling), and pour it into a tub or tight box, as stated above. Soap thus made is an excellent hard soap for family use ; after drying a month or so in a dry-room, and cut into bars, it is fit for use.

COUNTRY SOAP-MAKING, OR SOAP FROM THE LYE OF LEACHED ASHES.

In most parts of this country it is as convenient, and much cheaper, to make soap from the lye of leached ashes than from a soda lye.

To leach the ashes properly for this purpose, from two to five per cent. of lime should be added, to give proper causticity to the potash in solution which the lye contains. The ordinary process is to have a receptacle made of boards and lined with straw, shaped thus, the lye running through at the bottom. Upon the straw, fresh wood ashes mixed with a little lime, is placed, and water poured thereon and allowed to filter through and trickle out from the point into a proper vessel. The lye will not be of uniform strength. Hot water poured upon the ashes makes a stronger lye than cold ; in other words, it extracts more potash from the ashes. To get the lye to a uniform strength, and one proper for soap-making, boil it until a sound potato will float upon its surface. This is the farm wife's specific gravity test, and it is as accurate as any sold by the opticians. Then, into a kettle two-thirds full of lye, in with your melted fat, by ladlefuls at a time, and stir until it is creamy ; now begin to add the salt by small handfuls, stirring carefully and rapidly until a ring made of the

soapy matter on the stirring stick, remains visible. Then allow the fire to go out, and the soap to harden. It usually gathers on the top of the spent lye, from which it may be lifted when hard, or the lye can be poured off by tipping the kettle. Soft soap is made in the same way without the salt.

A correspondent of the American Agriculturist gives the following method of making soap for family use in the country :

I start the lye to boiling, and then while boiling, if the lye is not strong enough to eat the feather off a quill, boil it down until it is. When it will just eat the feather, let the kettle be a little more than one-third full of lye, and put in grease, skins of the hogs, bacon rinds, meat fryings, and the like, until the kettle is about two-thirds full. The kettle must not be full, for with the least bit too much fire, over the soap goes. It is better to put in a little less than the necessary amount of grease. Lye and grease combine in certain proportions, but pass the limit, and no amount of boiling will take up an excess of grease. It will remain on top, hot or cold, and will be very troublesome ; whereas a little too much lye will sink to the bottom when the soap comes. If the proportions are good, a little fire only is required to keep it boiling, and in a few hours it is done. Then take a bucket of weak lye, and let it boil up with the soap once. This will not disturb the already made soap, but will wash the dirt out that was in the grease, and with it settle to the bottom. When the soap is cold it can be cut out in cakes. Exposure to the air will soften it down until it is of about the consistence of mush, and a little darker, growing fairer and fairer. Some, instead of putting in lye to wash the dirt out of the soap, put in salt and water. The soap thus made is whiter, but is apt to be too stiff to use easily in the wash-tub. It makes excellent ball soap for washing dirty hands. I take some weaker lye and the clean part of that which is left in the bottom of the soap kettles, and enough to half fill one of the kettles or more, setting it in some convenient place outdoors. I put a stick of wood on

the north side of the top of the kettle, lay on some boards, making a roof which is easily managed to shed rain, and lay another stick on top to keep the roof in place. By lifting one of the boards a little, I can put in from time to time whatever soap-fat is gathered in the family through the summer. Whenever the sun shines, I remove the cover and stir the lye. I facilitate the business a little in this way, and I have by fall a half kettle of decent soap, and no trouble with soap-fat in hot weather.

WASHING FLUIDS.

This preparation answers very well for family washing, and saves soap considerably, which last is needful merely upon the most soiled portions, such as wristbands, collars, etc.

Sal-soda, three pounds.

Best unslacked lime, three quarters of a pound.

Hot water, four gallons.

Slack the lime in sufficient boiling water; add to it the sal-soda, previously dissolved in the four gallons of hot water; stir the whole thoroughly, and allow it to rest and settle; pour off the clear liquid; bottle it in clean bottles, and cork tight for use. To two pails of water add one pint of washing fluid, and boil the clothes in it (it is better to boil the water before adding the fluid).

This preparation in the proportions given, does not injure the linen, and diminishes the amount of soap and rubbing considerably. Another excellent one is as follows:

Take two pounds of the best brown soap; cut it up and put it in a clean pot, adding one quart of clean soft water. Set over the fire, and melt thoroughly, stirring it up from the bottom occasionally. Then take from the fire, and stir in one tablespoonful real white wine vinegar; two large tablespoonfuls of hartshorn, and seven

large tablespoonfuls of spirit of turpentine. Having stirred the ingredients well together, put the mixture immediately into a stone jar; cover without delay, lest the hartshorn evaporate. Keep it always closely covered. When going to wash, nearly fill a six or eight gallon tub with soft water, as hot as you can bear your hand in, and stir in two large tablespoonfuls of the mixture. Put in as many white clothes as the water will cover; let them soak about an hour, moving them about in the water occasionally. It will only be necessary to rub with the hands such parts as are badly soiled; the ordinary dirt will soak out. Wring out and rinse well through two cold waters.

Next put into the wash kettle sufficient water to boil the clothes (it must be cold at first), and add to it two tablespoonfuls of the washing mixture. Put in the clothes after the mixture is well stirred, and boil them half an hour, not more. Then take out and throw into a tub of cold water; rinse well in this, and lastly put into a second tub of rinsing water, slightly blued with the indigo bag. The double rinsing is important, and by following the above directions the washing mixture will save much time and labor, and render the clothes beautifully white, without injury.

SOFT SOAP.

For one barrel take potash, eight pounds; melted and clarified fat, eight pounds. Crack the potash in small lumps, and put it into a large iron pot of three or four gallons' capacity, with hot boiling water to nearly fill it. Heat the fat in another iron pot quite hot. Put three or four gallons of hot water in the barrel, previously cleaned and ready for use, and ladle in it alternately the hot fat and hot lye; stir the whole briskly for a while before more lye and fat are ladled in, and gradually add enough hot water to fill the barrel; stir again the whole, after each ladle of hot water, till the

whole becomes a creamy mass, uniform in its appearance. Allow it to rest for three months in a temperate place or cellar.

PROCESS FOR PURIFYING SOAP GREASE, AND RENDERING IT SUITABLE FOR SOAP-MAKING.

If the grease is very foul in smell, it should be put in a boiler with water, on the fire (about three times as much water as of the grease), a small quantity (say a teaspoonful for five to ten pounds of grease) of permanganate of potash added, by stirring, to the whole, and after the mixture has cooled a little, it is strained through a cloth, and allowed to rest, when the cake of fat is taken out and put in a cool place, or in the pot in which it is to be remelted for transformation into soap. The purpose of the permanganate of potash is to remove the rank odor of the grease, which otherwise would contaminate the soap also.

HOW TO PREPARE NEW FAT, AND SEPARATE FROM IT THE SKINS IN WHICH IT IS HELD, WHICH MAKES IT SO LIABLE TO BECOME RANCID.

The fresh fat or tallow is cut up in thin slices and stirred in a barrel with three to five times as much cold water. That is poured off after two or three hours of contact and stirring occasionally. The same is twice repeated over with new clean cold water, or till the water poured out is colorless. The fat is then transferred into a clean iron pot or copper kettle heated slowly, with one-third of its weight of water. For one hundred pounds of fat, put into the water four ounces of alum in fine powder, and eight ounces of salt; boil it along with the fat, ten or fifteen minutes; strain while hot; let it remain quiet for twenty-four hours, and take out the tallow cake to further wash it in cold clean water till no salt or alum taste is perceptible; then melt it over in a clean boiler; add one-quarter of a pound of benzoin in

powder ; boil the whole gently with care, with about a gallon of water ; skim it from time to time, and allow the water to evaporate almost completely on the fire ; let the whole settle, and pour the clear prepared fat carefully into clean firkins or crocks, for use, properly covered and kept in a cool cellar. Fat thus prepared will keep sweet and be suitable for cooking purposes, and also will take up the smell of sweet-scented flowers, such as the tuberose and others, by being first melted over a slow fire ; when melted, the sweet and strong-scented flowers are put in a vessel, closed by a lid, and the whole allowed to remain in contact at a temperature sufficient to keep the sweet fat liquid for forty-eight hours ; it is then strained, and it has acquired the odor of the flowers placed in contact with it. To concentrate the same odor, melt again at a low heat under the lid the same fat ; add another quantity of the same flowers, and proceed as before.

This scented fat can be softened for using as a flower pomade by adding to it, in the melted state, one-quarter to one-third of a pound of fine olive, almond or castor oil to make it less firm and of more convenient use for the purpose above set forth. Lard purified and prepared by the first process employed for the preparation of tallow, can be employed instead of the oils already mentioned, but being rather thicker, will require a larger proportion than of the oils, to make the pomade of a suitable consistency.

A NEW WAY TO PREPARE ANIMAL FAT FOR SOAP-MAKING, TO KEEP IT SWEET AND FACILITATE GREATLY ITS TRANSFORMATION INTO SOAP.

Tallow, when exposed at common temperature in the air, gradually acquires an unpleasant, rank smell. This can be prevented by cutting it in slices, and boiling it in water containing for every one-hundred pounds of fat (water, thirty-five to forty pounds), one-quarter of a pound of alum, one-half pound of salt ; this is boiled

together and strained; the cake of strained fat taken up and washed in clean water; then remelted at a low heat and poured into a barrel containing twice as much water (by measure) as of the melted grease, and to this water add about ten per cent. of good clear sweet soap compared to the amount of grease, the water not to be more than blood-heat, and the temperature of the grease about the same. The whole is thoroughly stirred with a broad stick till cold, when it is allowed to rest and separate from the water, which is afterward withdrawn, and the fat remaining, in a granular state, completely drained, and finally dried in a current of dry air, is then transferred and packed in firkins, crocks or barrels.

Grained fat thus prepared, is kept sweet, and is also acted on by the lye with far greater ease and rapidity, in consequence no doubt of its grain-like state, which enables the alkali in the lye to act upon a greater surface at once without requiring the boiling of the fat with the lye, and producing a soap free of rank smell, while the grained fat in suet may be preserved sweet for soap-making purposes for years, if thoroughly dried before packing away.

TO MAKE SOAP FROM GRAINED TALLOW.

Take of grained tallow, twenty-five pounds.

Hot lye, prepared with soda ash, six pounds; potash, two pounds.

Hot water seventeen to twenty gallons.

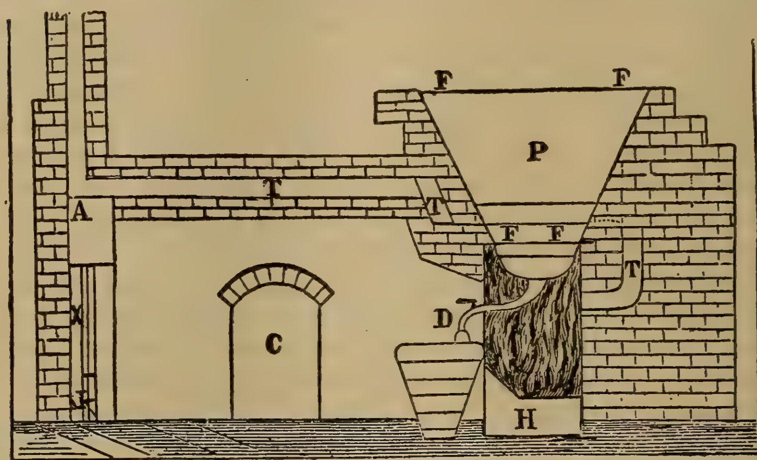
Put a portion of the hot lye into a clean barrel; stir in it the grained tallow; add the balance of hot lye, and keep up a brisk stirring for an hour or more; then allow it to rest, and before it is cold, pour it into a frame or tub as before stated, to set.

Although this plan is best adapted to persons wishing to make their own soap without an expensive apparatus as is required in the usual manufacturer's boiling soap pan system, the method of working the Grained Tallow on the large scale will also be given hereafter.

PREPARATION OF DOMESTIC SOAP BY PAN ON THE OPEN FIRE.

The following diagram represents the vertical section of a pan for soap boiling, and furnace.

The sides are composed of brick work erected, and



lined with Roman cement. The upper part, F F F F, which never comes in contact with the fire, and is intended to afford space for the soap to rise, expands in the form of an inverted cone. The fireplace, B, is separated from the ashpit, H, by the grate, R. The fire, after having heated the bottom of the pan, passes by the flue, T T T, half round the side of the pan into the chimney, A. This is made accessible by the door X; the soot is the room into the pit L. A, tube with a cock, leads from the lowest part of the pan for the removal of the under lye. The whole of the pan is sunk into the floor of the boiling house, which is made of planks, stone or iron, in such a manner that the brick work of the upper part projects to about three feet above the floor.

Wood, cast and sheet iron kettles are used, but the latter is the best; they will last longer than cast iron. They also, when burned through, can be satisfactorily repaired whereas the others are altogether useless. Here

again the soft sheet iron of the first quality should be selected, the bottom pan being from three-eighths to one-quarter of an inch thick, and the sides from three-sixteenths to one-quarter of an inch in thickness, according to dimensions. Much attention should be paid to riveting the pieces, so that no openings are left for leakage. The rivets, moreover, in the lower third part should be inserted evenly with the bottom, and counter sunk, otherwise the workman cannot go smoothly and thoroughly over with his crutch (a long stirrer the shape of a T)—a necessary part of the process, to prevent the soap from burning. Such a boiler, judiciously heated and carefully cleaned after each operation, will last five years and more without needing repairs.

In kettles designed for soap boiling, the heat must be confined to the bottom, for if it is allowed to circulate around the sides, the materials inside would inevitably burn. In order, then, to circumscribe the heat, it is necessary—

1st. That the grate be placed in the center of the hearth, and vertically below the kettle.

2d. That the inside of the fireplace be built of fire bricks, in order that the heat may be thrown back below the bottom of the kettle.

3d. The fuel employed to be that which produces the most heat and the least flame. Hard coal is then to be preferred.

4th. The openings through which the products of combustion pass and enter the chimney, should possess together the same surface as the grate, experience having shown that this is the best method for obtaining a good draft, and effecting a complete combustion of the fuel.

For transforming one hundred pounds of fat into soap (the yield in soap is about one hundred and sixty-five to one hundred and seventy pounds to the one hundred pounds of fat), from fifteen to twenty pounds of soda ash (or caustic soda) is required, according to the purity of the alkali—the purer it is the less it requires—and about one hundred and thirty gallons of pure water, previously deprived of the carbonic acid gas it naturally

holds in solution by boiling; by increasing the dose of soda-ash this extra labor may be avoided.

When about one-fourth of the lye has been added and mixed with the hot fat in the pan, it soon forms a milky cream, which in heating gradually becomes clearer, producing a transparent, soapy liquid, with oily drops intermingled. From time to time a drop of the pasty liquid should be put on the tongue; if there is still some uncombined lye in it, a burning or tingling sensation will be felt, in which case the boiling must be continued until a sweetish taste replaces the other impression, when again tasted as before. Then more lye is added gradually under constant stirring, until the whole is put in. At this stage, the contents of the kettle are modified into a uniform, clear mass, in which is to be seen neither fat nor lye. Should saponification progress slowly, a couple of pounds of soap shavings thrown in will assist the progress of the operations.

By heating with an open fire it sometimes happens that a portion of the soapy matter, when it thickens, adheres to the bottom of the pan, and becoming overheated, burns and produces a smoky vapor. When this occurs, the fire should be forthwith reduced, and a few gallons of strong lye added to prevent further mischief. By this means a slight separation of the soap from the lye is produced, and the mischief arrested. In all cases the operation described above is complete when, having taken out the stirring rod or crutch, the soapy parts no longer run from it, but slide down in long threads. This is called the spinning of the soap.

When all the lye has been made to combine with the fat, and the soap is substantially made, it may be separated from the watery portion containing the glycerine and an excess of alkaline salts by slowly boiling the mass down till the soap separates from the liquid below it; but this is more tedious, and requires greater experience in conducting the operation than the following mode of proceeding, called "the salting process." The soap is kept gently boiling, one workman gradually adds dry, pure salt, while another workman agitates the soapy

mass with a crutch from below, upwards. From 12 to 16 lbs. is needed for 100 lbs. of fat changed into soap, and should be put in in the proportion of about one eighth of the whole salt at a time. However, after one-half has been added, the soap should be allowed to boil for about ten minutes before more is added. The separation is perfect when the watery portion is observed to run off from the curdy mass ; when a sample is taken up with a knife it is not sticky while hot, and when placed on the hand and rubbed with the fingers, it hardens into scaly lumps. The surface of the soap, furthermore, splits into several fields, separated from one another by deep furrows, in which there is not the soft appearance of froth, but of dry slabs, which slowly arrange themselves above one another by the force of the escaping hot vapor from below.

The fire should then be put out, when the soap in the main, which was always covered with froth and bubbles, sinks, and the froth breaks up into roundish, massive, grain-like matter, distinct from each other and from the watery portion.

The salting process being completed, the whole should be allowed to remain undisturbed for several hours, and afterward the watery liquid underneath drawn off through the faucet below. The glycerine in that liquid can be separated and collected for use in the arts, but for the process, as given by a French chemist,* it could not be rendered practicable, with profit, on a small scale. On the whole, the soap water waste can be usefully thrown over the compost pit for manuring purposes, and it is probably the best use it can be put to by such manufacturers in the country.

After the withdrawal of the watery part, the soap is ladled out into wooden frames to set, and be afterward cut in bars. The soap as thus prepared is called grained soap. It may, however, be further purified for fine toilet soaps by re-dissolving it in an alkaline lye, and separating by common salt as before stated. During this

* See American Journal of Pharmacy, XX., 549.

last process, any remaining impurities subside, and the soap combines with more water, and hence it becomes weaker, but purer and whiter. If the mottled red and gray appearance of castile soap is desired, that can be imparted to the grained soap by adding to it as soon as it is completely separated, a fresh portion of lye, and immediately afterward about one ounce of sulphate of iron. The black oxide of iron is precipitated, and gives rise to dark colored streaks, which, by exposure to the air, become gradually red in consequence of the conversion of the black oxide, first produced by the lye changing into red oxide of iron through the action of the oxygen in the air.

ROSIN SOAP.

Fifteen per cent. of rosin can be saponified with potash or soda lye, and mixed with clear, warm tallow soap to a good purpose ; more would deteriorate it, although for the cheapest grade of soaps, thirty-three per cent. is often added ; but such soaps remain soft and clammy, and are unsatisfactory to the consumer. Twelve gallons of strong lye (30° to 36° Beaumé) are needed for 100 lbs. of rosin. Some soap-makers melt it with the fat in the commencement of the boiling of the soap, but experience has shown that it is best to prepare a pure tallow soap first, and afterward mix with it the rosin soap, made in a separate kettle. Both soaps in the hot state are to be thoroughly incorporated, by stirring and beating intimately for half an hour, and the whole passed through a wire sieve before transferring to the frames, and therein also well stirred with the crutch. Some palm oil, when saponified along with the tallow, will much improve the appearance of such a soap.

The rosin, previous to its being put in contact with the lye, should be ground fine, and while one workman is occupied in throwing it into the boiler containing the hot lye, another should be constantly occupied in stirring it in, as the mixture easily rises. The heat must not be too rapidly increased, nor is it necessary that it

should boil all the time, but merely kept near the boiling point; but it is indispensable to keep stirring the mixture all the time, otherwise caking of the rosin will interfere with the progress of the operation. Saponification will be completed in about two hours, and then it may be added to the fat about being converted into soap, as above described.

TRANSPARENT SOAPS

Are usually prepared from good tallow and rosin soap thoroughly dried and cut into thin shavings. These are stirred in strong alcohol (sp. gr., 849.), heated in a still to the boiling point in a water-bath or steam jacket arrangement; a stirring rod being connected with the still the soap is promptly dissolved, and the alcohol condensed in a worm and recipient, for future operations, while the soap is discharged from its boiler through a pipe and faucet at the bottom into a kettle, where it is rapidly perfumed with essential oils, and from there into molds of any given form for purposes of sale. Three and a half to four gallons of alcohol are usually employed in dissolving 50 lbs. of soap in shavings.

FOR SOAP-MAKING BY THE COLD WAY.

The fat is melted at a low heat, not warmer than blood heat, and the lye gradually added—40 lbs. of strong lye (about 36°, Beaumé *) to 80 lbs. of fat, and less, even should the lye be stronger still. The lye should be perfectly clear, and not more than tepid in temperature. The fat and the lye should be persistently stirred with a broad wooden spatula, having sharp edges at its lower end, and rounded at its upper, for easy handling. The paddling should be kept up until a ring drawn with the spatula remains visible a short time.

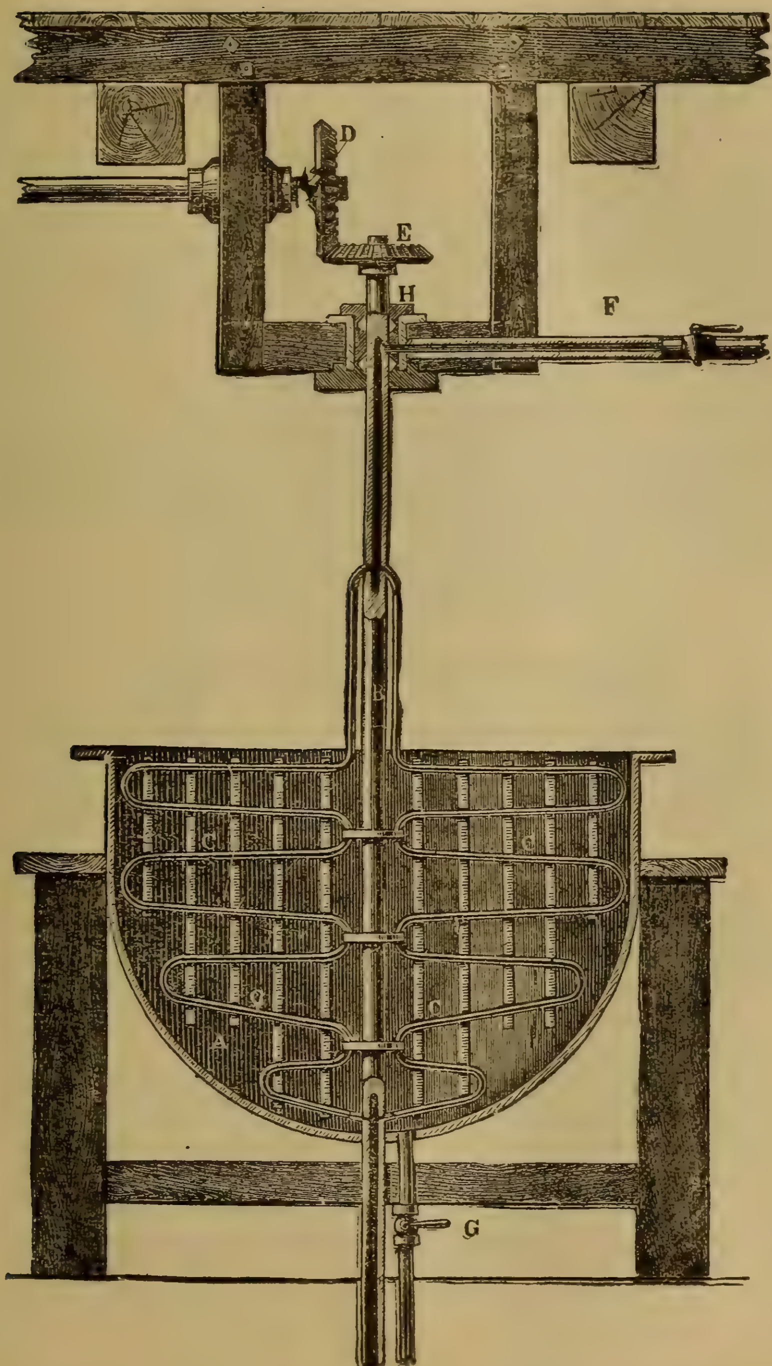
* Pronounced Bo-may. By the use of this word we mean Beaumé's hydrometer, which can be purchased of any manufacturer of thermometers.

It is at that point that the coloring matters and perfumes are added, if any are wanted.

The parts should then be run into frames, previously lined with muslin so carefully that no folds be formed at the edges of the box. Each frame should be entirely filled with the soap, and well closed, with the margin of the muslin, and also fitted with a modern cover. The whole should be left for about one day to rest in a mild temperature,the complete change or saponification completing itself in the frames, where the temperature rises spontaneously to sometimes over 175° F. Under the influence of this action the various constituent principles in the mass, including the glycerine, become further combined, and a soap produced almost resembling that of boiled soaps. At the expiration of twenty-four hours the soap may be taken up from the frames, and cut up in bars to dry. Sometimes, especially when mutton tallow is mostly employed with soda for the lye, one-tenth of potash is added, to diminish the hardness of the soap ; at the same time it increases its solubility and quality, the soap resulting from that addition not being brittle when dry, as it would be when exclusively made of hard tallow and soda lye. The yield of such soap is about 150 lbs. to 100 lbs. of fat.

SOAP-MAKING BY STEAM.

In large manufactories steam is now employed for the manufacture of soap. The use of it injures the vessels used less than fire, and burning the soap is entirely avoided. Both exhaust and live steam are used, and the simplest method for the employment of either is with an open kettle with double walls. Between these double walls of the kettle the steam may be used, while a coil is introduced into the interior of the kettle, through which steam is also passed. Still better, according to German authorities, is the steam and stirring apparatus of Morfit, which is delineated in the figure annexed. It will be easily understood by examining the illustration that B is a hollow or pipe shaft passing through the


D
E
H
F
B
G
G
A
G

stuffing box at H, and movable perpendicularly by the motion of the cogged wheel D, which motion is directly communicated to the wheel E. Attached to B are two sets of pipes, C C, bent as delineated. F is a pipe from the boiler for the introduction of steam. The steam passes along F into the stuffing box at H ; here, the pipe B being perforated, the steam enters it, and passes down into C C. Now by a crank, the wheel D is moved, the motion is communicated to E, and consequently to B and C C. The latter arrangement of pipes moves horizontally in the mixed lye and fat, and thus acts as a stirrer, while at the same time it communicates the heat needed to carry on the process. It is well to say, however, that though exhaust steam may just answer to produce soap in this apparatus from the easily saponified palm and cocoa-nut oil, it will hardly answer for olive and more refractory fats.

SOAP-MAKING IN CLOSED VESSELS.

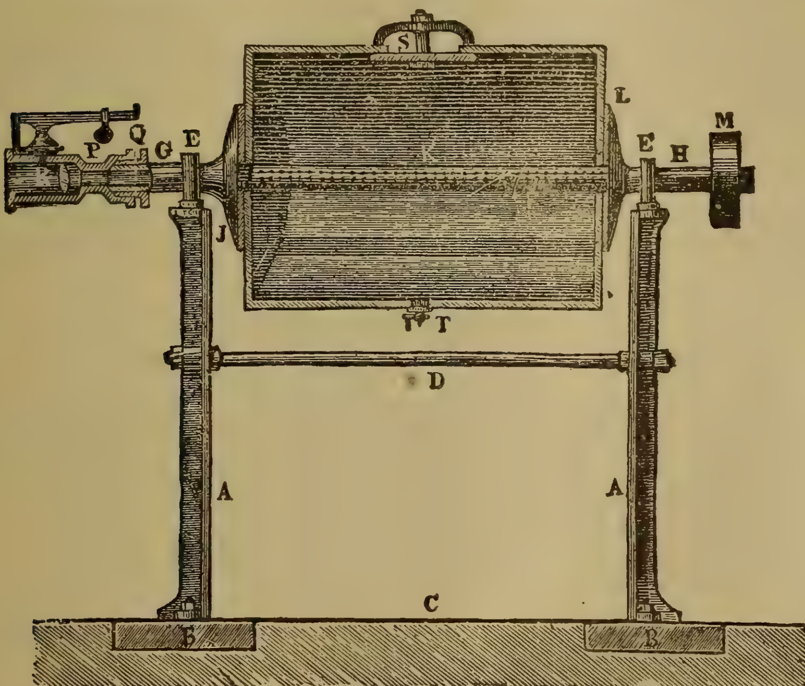
The effort to use steam in closed vessels under pressure has been tried with a partial success only. The apparatus of Mouveau consists of a kettle provided with a man-hole, a safety-valve, and a stirring apparatus. It is, moreover, provided with a collar, through which steam or cold water may be passed as required.

The temperature in this is allowed to reach about 150° Centigrade (302° F.). The fat and lye are introduced at the beginning of the operation by the man-hole, which is then closed. After the air is well expelled by the heat, the safety-valve is also closed. Further charges of lye or fat are driven into the vessel by a force pump. The soap and spent lye are withdrawn by means of cocks connecting with a pipe running through the collar of the vessel. According to Mouveau, the closed vessel gives an economy of time, labor and fuel. But there is this drawback connected with its use, to wit : the progress of the mixture toward saponification cannot be ex-

amined, and such operations as salting cannot be nicely and easily performed.

SOAP BOILING WITH LIVE STEAM USED DIRECT.

The use of steam indirectly by the medium of double walled kettles, or through coils, leads to a loss of heat. The use of exhaust steam in direct contact with the



fluids carries too much water into the soap, the cause being the ready condensation of the exhaust steam. Live steam is applied directly to the grease and lye by various machines. One method is simply to introduce the steam by a cock into an open kettle containing the materials, and many of the best soaps are so made in England. Another method is with the closed vessel. A

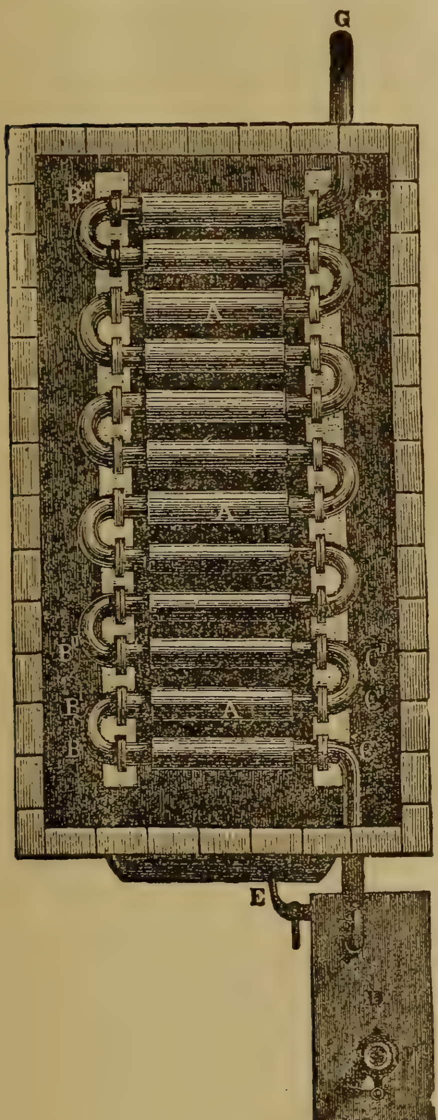
machine patented in England by R. Hodgson and C. Holden, adapted to this method, we here give a diagram and description of. It is a cylinder resting as depicted (p. 29), and movable on its axis, having a perforated pipe, K, through which steam is admitted to the soapy mass in the cylinder. At S is a man-hole for the insertion and withdrawal of the materials. At T a spigot. When steam is first admitted, the cover to the man-hole at S being securely fastened, the cylinder is turned so that T comes uppermost; the cock is opened; the air allowed to escape, and the cock closed again. A continuation or prolongation of the central steam pipe passes through a stuffing box, and has connection with a steam gauge and safety-valve.

This apparatus has the same fault as all closed vessels —the saponifying process cannot be closely examined. There is almost a necessity in these cases of withdrawing the partially formed soap into an open boiler, and finishing the process.

BOILING WITH SUPER-HEATED STEAM.

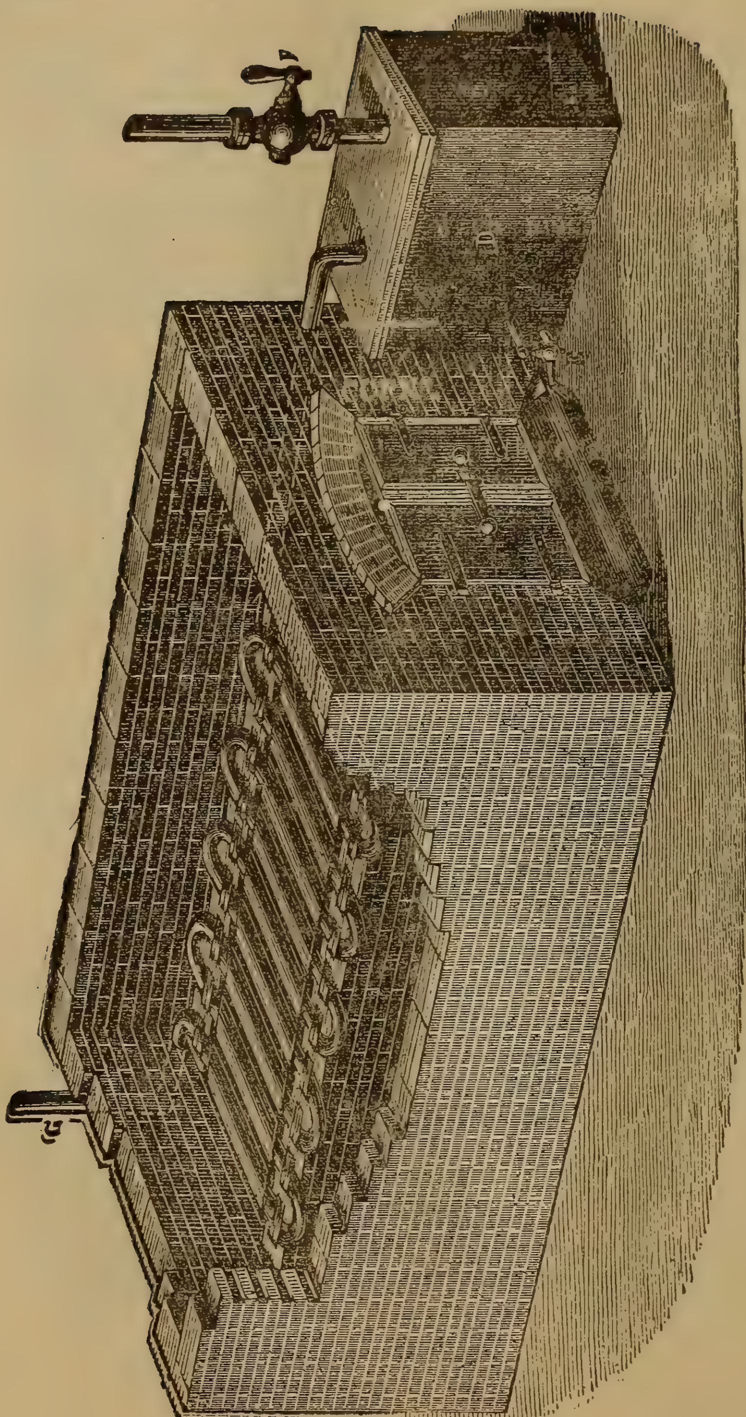
The best method of employing steam in large manufactories, is to use it in a super-heated condition. The accompanying figures will exhibit the process of superheating the steam, and of controlling its passage. The first figure (p. 31) exhibits the super-heating coil, the middle portions of which, A, are composed of cast-iron; the joints with the curved piping, C C, etc., and B B, etc., are made steam-tight in the usual way. The second figure (p. 32) shows the coil in the furnace. The fire plays only directly upon the cast-iron portions of the coil. The steam, previous to being admitted to the coil, passes through the condensing chest, D, to which is attached a cock, E, to let off the water of condensation. A steam cock at F gives control of the passage of the steam. G permits the flow of the super-heated steam to the soap kettle. Super-heated steam may be used like ordinary steam, but, as previously stated, the open kettle is preferable.

The coil should be heated previous to the admission of steam from half an hour to an hour, and the temperature of the passing steam may be comparatively low in the early portion of the process, gradually raising it to a height of 150° or 160°, Centigrade. The admission of the steam being fully under control by means of the cock at F, there can be no boiling over. There is no danger of burning the soap, and in short, the use of super-heated steam commends itself to the large manufacturer of soap as the readiest and most economical method yet devised.



ADULTERATION OF SOAP.

Soap is not exempted from the manipulation of fraud. Its external appearance often prevents the unpracticed eye from detecting the impurities it may contain, without further examination.



China clay is a common addition made to soap to increase its bulk. If a soap containing it be dissolved in hot water, one part of soap in ten of water, on allowing the solution to rest, the clay will be found at the bottom of the vessel, and its proportion in the soap ascertained.

Soap largely admixtured with soluble glass (a solution of flint or silica in an excess of caustic soda) is very common in the market. Its weight is much greater than that of soap in its unadulterated state, and will usually show at once the probability of such an admixture, although such a soap may leave no sediment in a solution of it in hot water; but it is unsafe to employ it for washing fine fabrics, as it is apt to weaken them on account of the excess of alkali it imparts to the soap with which it is mixed.

From 10 to 30 per cent. of the silicate of soda is generally added. The soap feels somewhat hard and gritty in use. The soluble glass is introduced gradually into the pan after all the grease is in, and stirred actively until thoroughly mixed.

Soap is also sometimes contaminated with lime; this renders it partially insoluble in water, and makes it unfit for the laundry or the toilet.

FUSED SULPHATE OF SODA.

This article has been used to harden soaps, which, made from inferior fats, would otherwise be too soft. This substance (Glauber salts, melted on a shovel or otherwise,) added to the soap in the proportion of 1 lb. of the salt to 20 lbs. of the soap, is said to remedy the defect, and to make a hard and sound soap out of what would otherwise be too soft for economical use.

MOTTLED SOAP.

The mottled appearance given to uncolored soap is produced by watering the nearly finished soap with strong

soda lye, by means of a watering can furnished with a rose spout.

TOILET SOAPS.

FROM PIESSE'S ART OF PERFUMERY.

The primary soaps are divided into hard and soft soaps: the hard soaps contain soda as the base; those which are soft are prepared with potash. These are again divisible into varieties, according to the fatty matter employed in their manufacture, also according to the proportion of alkali. The most important of these to the perfumer is what is termed curd soap, as it forms the basis of all the highly-scented soaps.

Curd soap is a nearly neutral soap of pure soda and fine tallow.

Oil soap, as made in England, is an uncolored combination of olive oil and soda, hard, close grain, and contains but little water in combination.

Castile soap, as imported from Spain, is a similar combination, but is colored by protosulphate of iron. The solution of the salt being added to the soap after it is manufactured, from the presence of alkali, decomposition of the salt takes place, and protoxide of iron is diffused through the soap of its well-known black color, giving the familiar marbled appearance to it. When the soap is cut up into bars, and exposed to the air, the protoxide passes by absorption of oxygen into peroxide; hence, a section of a bar of castile soap shows the outer edge red-marbled, while the interior is black-marbled. Some castile soap is not artificially colored, but a similar appearance is produced by the use of a barilla or soda containing sulphuret of the alkaline base, and at other times from the presence of an iron salt.

Marine soap is a cocoa-nut oil soap, of soda, containing a great excess of alkali, and much water combination.

Yellow soap is a soda soap of tallow, rosin, of lard, etc., etc.

Palm soap is a soda soap of palm oil, retaining the peculiar odor and color of the oil unchanged. The odoriferous principle of palm oil resembling that from orris-root, can be dissolved out of it by tincturation with alcohol ; like ottos generally, it remains intact in the presence of an alkali, hence soap made of palm oil retains the odor of the oil.

The public require a soap that will not shrink and change shape after they purchase it. It must make a profuse lather during the act of washing. It must not leave the skin rough after using it. It must be either quite inodorous or have a pleasant aroma. None of the above soaps possess all these qualities in union, and, therefore, to produce such an article is the object of the perfumer in his remelting process.

Fig soft soap is a combination of oils, principally olive oil of the commonest kind, with potash.

Naples soft soap is a fish oil (mixed with Lucca oil) and potash, colored brown for the London shavers, retaining, when pure, its unsophisticated "fishy" odor.

The above soaps constitute the real body or base of all the fancy scented soaps as made by the perfumers, which are mixed and remelted according to the following formula :

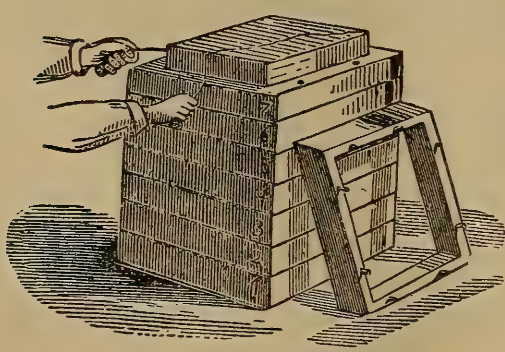
The remelting process is exceedingly simple. The bar soap is first cut up into thin slabs, by pressing them against a wire fixed upon the working bench. This cutting wire (piano wire is the kind) is made taut upon the bench, by being attached to two screws. These screws regulate the height of the wire from the bench, and hence the thickness of the slabs from the bars. The soap is cut up into thin slabs, because it would be next to impossible to melt a bar whole, on account of soap being one of the worst conductors of heat.

The melting pan is an iron vessel, of various sizes, capable of holding from 28 lbs. to 3 cwt., heated by a steam jacket, or by a water bath. The soap is put into the pan by degrees, or what is in the vernacular called "rounds," that is, the thin slabs are placed perpendicularly all round the side of the pan ; a few ounces of

water are at the same time introduced, the steam of which assists the melting. The pan being covered up, in about half an hour the soap will have "run down." Another round is then introduced, and so continued every half hour until the whole "melting" is finished. The more water a soap contains, the easier is it melted; hence a round of marine soap, or of new yellow soap will run down in half the time that it requires for old soap.

When different soaps are being remelted to form one kind when finished, the various sorts are to be inserted into the pan in alternate rounds, but each round must consist only of one kind, to insure uniformity of condition. As the soap melts, in order to mix it, and to break up lumps, etc., it is from time to time "crutched." The "crutch" is an instrument or tool for stirring up the soap; its name is indicative of its form, a long handle with a short cross—an inverted T, curved to fit the curve of the pan. When the soaps are all melted, it is then colored, if so required, and then the perfume is added, the whole being thoroughly incorporated with the crutch.

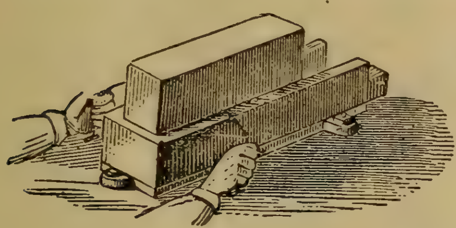
The soap is then turned into the "frame." The frame is a box made in sections, in order that it can be taken to pieces, so that the soap can be cut up when cold; the sections or "lifts" are frequently made of the width of the intended bar of soap.



Frame and Stab Gauge.

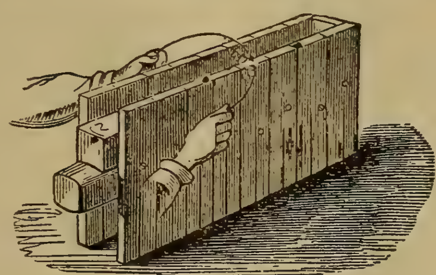
Two or three days after the soap has been in the frame, it is cool enough to cut into slabs of the size of the lifts or sections of the frame; these slabs are set up edgeways to cool for a day or two more; it is then barred by means of a wire. The lifts of the frame regulate the widths of the bars; the guage regulates their breadth. The density of the soap being

pretty well known, the gauges are made so that the soap-cutter can cut up the bars either into fours, sixes, or eights; that is, either into quarters of four, six, or eight to the pound weight. Latterly, various mechanical arrangements have been introduced for soap-cutting, which in very large establishments, such as those at Marseilles, in France, are great economizers of labor; but in England the "wire" is still used.

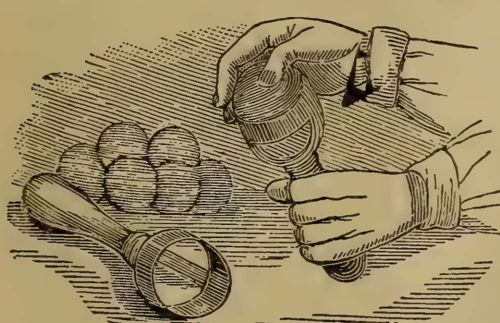


Barring Gauge.

For making tablet shapes the soap is first cut into squares, and is then put into a mold, and finally under a press—a modification of an ordinary die or coin press. Balls are cut by hand, with the aid of a little tool called a "scoop," made of brass or ivory, being, in fact, a ring-shaped knife. Balls are also made in a press with a mold of appropriate form. The grotesque form and fruit shape are also obtained by the press and appropriate molds. The fruit-shaped soaps, after leaving the mold, are dipped into melted wax, and are then colored according to artificial fruit-makers' rules The "variega-

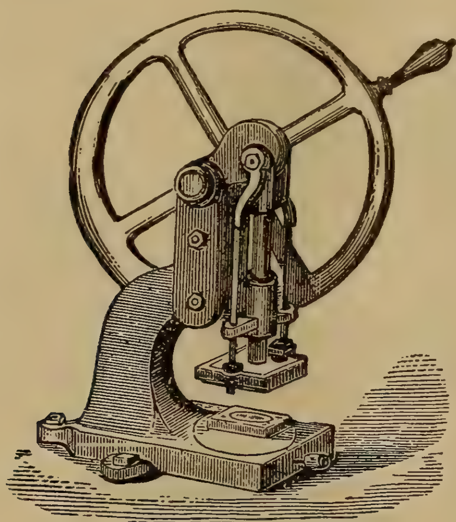


Squaring Guage.



Soap Scoop.

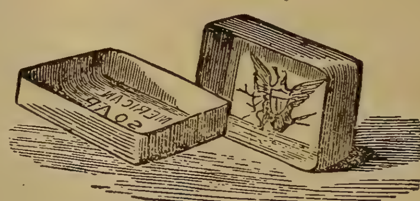
ted" colored soaps are produced by adding the various colors, such as smalt and vermilion, previously mixed with water, to the soap in a melted state; these colors are but slightly crutched in, hence the streaky appearance or particolor of the soap; this kind is also termed "marbled" soap.



Soap Press.

Almond Soap.—This soap, by some persons supposed to be made of "sweet almond oil," and by others to be a mystic combination of sweet and bitter almonds, is in reality constituted thus:

Finest curd soap, 1 cwt.; finest oil soap, 14 lbs.; finest marine, 14 lbs.; otto of almonds, $1\frac{1}{2}$ lb.; otto of cloves, $\frac{1}{4}$ lb.; otto of caraway, $\frac{1}{2}$ lb. By the time that half the curd soap is melted, the marine soap is to be added; when this is well crutched, then add the oil soap, and finish with the remaining curd. When the whole is well melted, and just before turning it into the frame, crutch in the mixed perfume.



Molds.

Some of the soap "houses" endeavored to use Mirabane or artificial essence of Almonds (Benzole) for perfuming soap, it being far cheaper than the true otto of almonds; but the application has proved so unsatisfactory in practice, that it has been abandoned by Messrs. Gibbs, Pineau (of Paris), Gosnell, and others who used it.

Camphor Soap.—Curd soap, 28 lbs.; otto of rosemary, 1½ lb.; camphor, 1¼ lb. Reduce the camphor to powder by rubbing it in a mortar, with the addition of an ounce or more of almond oil, then sift it. When the soap is melted and ready to turn out, add the camphor and rosemary, using the crutch for mixing.

Honey Soap.—Best yellow soap, 1 cwt.; fig soft soap, 14 lbs. ; otto of citronella, 1½ lb.

White Windsor Soap.—Curd soap, 1 cwt.; marine soap, 21 lbs.; oil soap, 14 lbs.; otto of caraway, 1½ lb.: otto of thyme, of rosemary, each, ½ lb.; otto of cassia, of cloves, each, ¼ lb.

Brown Windsor Soap.—Curd soap, ¾ cwt.; marine soap, ¼ cwt.; yellow soap, ¼ cwt.; oil soap, ¼ cwt.; brown coloring (caramel *), ½ pint ; otto of caraway, of cloves, of thyme, of cassia, of petit grain, of French lavender, each, ½ lb.

Sand Soap.—Curd soap, 7 lbs.; marine soap, 7 lbs.; sifted silver sand, 28 lbs.; otto of thyme, of cassia, of caraway, of French lavender, each, 2 oz.

Fuller's Earth Soap.—Curd soap, 10½ lbs.; marine soap, 3½ lbs.; Fuller's earth (baked), 14 lbs.; otto of French lavender, 2 oz.; otto of origanum, 1 oz.

The above forms are indicative of the method adopted for perfuming soaps while hot or melted.

All the very highly scented soaps are, however, perfumed cold, in order to avoid the loss of scent, 20 per cent. of perfume being evaporated by the hot process.

The variously named soaps, from the sublime "Sultana" to the ridiculous "Turtle's Marrow" we cannot, of course, be expected to notice ; the reader may, however, rest assured that he has lost nothing by their omission.

The recipes given produce only the finest quality of the article named. Where cheap soaps are required, not much acumen is necessary to discern that by omitting the expensive perfumes, or lessening the quantity, the object desired is attained. Still lower qualities of scented soap are made by using greater proportions of

* Burned sugar.

yellow soap, and employing a very common curd, omitting the oil soap altogether.

SCENTING SOAPS HOT.

In the previous remarks, the methods explained of scenting soap involved the necessity of melting it. The high temperature of the soap under these circumstances involves the obvious loss of a great deal of perfume by evaporation. With very highly scented soaps, and with perfume of an expensive character, the loss of ottos is too great to be borne in a commercial sense; hence the adoption of the plan of scenting soaps cold.

SCENTING SOAPS COLD.

This method is exceedingly convenient and economical for scenting small batches, involving merely mechanical labor, the tools required being simply an ordinary carpenter's plane, and a good marble mortar, and lignum vitæ pestle.

The woodwork of the plane must be fashioned at each end, so that when placed over the mortar it remains firm and not easily moved by the parallel pressure of the soap against its projecting blade.

To commence operations, we take first 7 lbs., 14 lbs., or 21 lbs. of the bars of the soap that it is intended to perfume. The plane is now laid upside down across the top of the mortar.

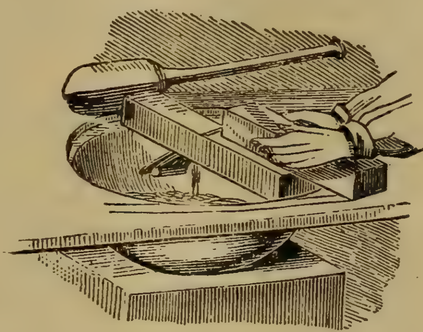
Things being thus arranged, the whole of the soap is to be pushed across the plane until it is all reduced into fine shavings. Like the French "Charbonnier," who does not saw the wood, but woods the saw, so it will be perceived that in this process we do not plane the soap, but that we soap the plane, the shavings of which fall lightly into the mortar as quickly as produced.

Soap as generally received from the maker is in the proper condition for thus working; but if it has been in stock any time it becomes too hard, and must have from one to three ounces of distilled water sprinkled in the shaving for every pound of soap employed, and must lay

for at least twenty-four hours to be absorbed before the perfume is added to it.

When it is determined what size the cakes of soap are to be, what they are to sell for, and what it is intended they should cost, then the maker can measure out his perfume.

The soap being in a proper physical condition with regard to moisture, etc., is now to have the perfume well stirred into it. The pestle is then set to work for the process of incorporation. After a couple of hours of "warm exercise," the soap is generally expected to be free from streaks, and to be of one uniform consistency.



Soaping the Plane.

For perfuming soap in large portions by the cold process, instead of using the pestle and mortar as an incorporator, it is more convenient and economical to employ a mill similar in construction to a cake chocolate-mill, or a flake cocoa-nut mill; any mechanical apparatus that answers for mixing paste and crushing lumps will serve pretty well for blending soap together.

Before going into the mill, the soap is to be reduced to shavings, and have the scent and color stirred in; after leaving it, the flakes or ribands of soap are to be finally bound together by the pestle and mortar into one solid mass; it is then weighed out in quantities for the tablets required, and molded by the hand into egg-shaped masses; each piece being left in this condition, separately laid in rows on a sheet of white paper, dries sufficiently in a day or so to be fit for the press, which is the same as that previously mentioned. It is usual, before placing the cakes of soap in the press, to dust them over with a little starch powder, or else to very slightly oil the mold; either of these plans prevents the soap from

adhering to the letters or embossed work of the mold—a condition essential for turning out a clean, well-struck tablet.

The body of all the fine soaps mentioned below should consist of the finest and whitest curd soap, or of a soap previously melted and colored to the required shade, thus:

Rose-colored soap is curd soap stained with vermilion, ground in water, thoroughly incorporated when the soap is melted, and not very hot.

Green soap is a mixture of palm oil soap and curd soap, to which is added powdered smalt ground with water.

Blue soap, curd soap colored with smalt.

Brown soap, curd soap with caramel, *i. e.*, burned sugar.

The intensity of color varies, of course, with the quantity of coloring.

Some kinds of soap become colored or tinted to a sufficient extent by the mere addition of the ottos used for scenting, such as "spermaceti soap," "lemon soap," etc., which become of a beautiful pale lemon color by the mere mixing of the perfume with the curd soap.

Otto of Rose Soap.—(An expensive kind of soap).—Curd soap (previously colored with vermilion), 4½ lbs.; otto of rose, 1 oz.; spirituous extract of musk, 2 oz.; otto of santal, ¼ oz.; otto of geranium, ¼ oz. Mix the perfumes, stir them in the soap shavings, and beat together.

Tonquin Musk Soap.—Pale brown-colored curd soap, 5 lbs.; grain musk, ¼ oz.; otto of bergamot, 1 oz. Rub the musk with the bergamot, then add it to the soap, and beat up.

Orange Flower Soap.—Curd soap, 7 lbs.; otto of neroli, 3½ oz.

Santal-wood Soap.—Curd soap, 7 lbs.; otto of santal, 7 oz.; otto of bergamot, 2 oz.

Spermaceti Soap.—Curd soap, 14 lbs.; otto of bergamot, 2½ lbs.; otto of lemon, ½ lb.

Citron Soap.—Curd soap, 6 lbs.; otto of citron, ¾ lb.; otto of verbena (lemon grass), ½ oz.; otto of bergamot,

4 oz. ; otto of lemon, 2 oz. One of the best of fancy soaps that is made.

Frangipanni Soap.—Curd soap (previously colored light brown), 7 lbs. ; civet, ¼ oz. ; otto of neroli, ½ oz. ; otto of santal, 1½ oz. ; otto of rose, ¼ oz. ; otto of vitivert, ½ oz. Rub the civet with the various ottos, mix, and beat in the usual manner.

Patchouly Soap.—Curd soap, 4½ lbs. ; otto of patchouly, 1 oz. ; otto of santal, of vitivert, each, ¼ oz.

SAPONACEOUS CREAM OF ALMONDS.

The preparation sold under this title is a potash soft soap of lard. It has a beautiful pearly appearance, and has met with extensive demand as a shaving soap. Being also used in the manufacture of Emulsines, it is an article of no inconsiderable consumption by the perfumer. It is made thus : Clarified lard, 7 lbs. ; potash lye (containing 26 per cent. of caustic potash), 3¾ lbs. ; rectified spirit, 3 oz. ; otto of almonds, 2 drachms.

Manipulation.—Melt the lard in a porcelain vessel by a salt water bath, or by a steam heat under 15 lbs. pressure ; then run in the lye, very slowly, agitating the whole time ; when about half the lye is in, the mixture begins to curdle ; it will, however, become so firm that it cannot be stirred. The crême is then finished, but is not pearly ; it will, however, assume that appearance by long trituration in a mortar, gradually adding the alcohol, in which has been dissolved the perfume.

SOAP POWDERS.

These preparations are sold sometimes as a dentrifice, and at others for shaving ; they are made by reducing the soap into shavings by a plane, then thoroughly drying them in a warm situation, afterward grinding in a mill, then perfuming with any otto desired.

Rypophagon Soap.—Best yellow soap, fig soft soap, equal parts melted together. Perfume with anise and citronella.

AMBROSIAL CREAM.

Color the grease very strongly with alkanet root, then proceed as for the manufacture of saponaceous cream. The cream colored in this way has a blue tint; when it is required of a purple color, we have merely to stain the white saponaceous cream with a mixture of vermilion and smalt to the shade desired. Perfume with otto of oringeat.

Transparent Soft Soap.—Solution caustic potash (Lond. Ph.), 6 lbs. ; olive oil, 1 lb. Perfume to taste.

Before commencing to make the soap, reduce the potash lye to one half its bulk by continued boiling. Now proceed as for the manufacture of saponaceous cream. After standing a few days, pour off the waste liquor.

Juniper Tar Soap.—This soap is made from the tar of the wood of the Juniperus communis, by dissolving it in a fixed vegetable oil, such as almond or olive oil, or in fine tallow, and forming a soap by means of a weak soda lye, after the customary manner. This yields a moderately firm and clear soap, which may be readily used by application to parts affected with eruptions, at night, mixed with a little water, and carefully washed off the following morning. This soap has lately been much used for eruptive disorders, particularly on the continent, and with varying degrees of success. It is thought that the efficient element in its composition is a rather less impure hydrocarburet than that known in Paris under the name "huile de cade." On account of its ready miscibility with water, it possesses great advantage over the common tar ointment used for itch, etc.

Salt Water Soap.—5 lbs. caustic soda, 7 gallons of water for the lye ; 25 lbs. cocoa-nut oil or lard, as it is sometimes called ; melt the oil, and introduce the lye gradually, and stir actively until creamy. A very small proportion of fused Glauber salts helps to make the soap harden.

Chlorinated Soap.—From castile soap (in powder), 11 oz. ; chloride of lime (dry and good), 1 oz. ; mix, beat them to a mass with rectified spirit, q. s. ; holding in

solution oil of verbena or of ginger grass, $\frac{1}{4}$ oz. ; lastly, form the mass into flat tablets, and wrap these in thin sheet gutta percha. A most excellent detergent and stimulant soap in various affections, admirably adapted for hospital use, and for removing stains from the skin and rendering it white. It is the most powerfully known agent against infection from contagious diseases communicated by contact.

Iodine Soap.—From castile soap (sliced) 1 lb. ; iodide of potassium, 1 oz. ; dissolved in water, 3 fl. oz. ; melt them together in a glass or porcelain vessel, over a water bath. Excellent in various skin diseases ; also as a common soap for scrofulous subjects.

Sulphuretted Soap.—From white soap, 2 oz. ; sublimed sulphur, $\frac{1}{4}$ oz. ; beaten to a smooth paste in a marble mortar with 1 or 2 fl. dr. of rectified spirit strongly colored with alkanet root, and holding in solution otto of roses, 10 or 12 drops. In itch and various other cutaneous diseases.

Arsenical Soap.—From carbonate of potash, 12 oz. ; white arsenic, white soap and air-slaked lime, of each, 4 oz. ; powdered camphor, $\frac{3}{4}$ oz. ; made into a paste with water, q. s. Used to preserve the skins of birds and other small animals.

Black Soap.—A crude soft soap, made of fish oil and potash ; but the following mixture is usually sold for it : Soft soap, 7 lb. ; train oil, 1 lb. ; water, 1 gallon ; boil to a proper consistence, adding ivory black or powdered charcoal, q. s. to color. Used by farriers.

EMULSINES.

From soaps proper we now pass to those compounds used as substitutes for soap, which are classed together under one general title as above, for the reason that all cosmetiques herein embraced have the property of forming emulsions with water.

Chemically considered, they are an exceedingly interesting class of compounds, and are well worthy of study. Being prone to decomposition, as might be expected from their composition, they should be made

only in small portions, or at least only in quantities to meet a ready sale.

While in stock they should be kept as cool as possible, and free from a damp atmosphere.

Amandine.—Fine almond oil, 7 lbs. ; simple syrup,* 4 oz. ; white soft soap, or saponaceous cream, *i. e.*, crême d'Amande,† 1 oz. ; otto of almonds, 1 oz. ; otto of bergamot, 1 oz. ; otto of cloves, ½ oz. Rub the syrup with the soft soap until the mixture is homogeneous, then rub in the oil by degrees; the perfume having been previously mixed with the oil.

In the manufacture of amandine (and olivine) the difficulty is to get in the quantity of oil indicated, without which it does not assume that transparent jelly appearance which good amandine should have. To attain this end, the oil is put into "a runner," that is, a tin or glass vessel at the bottom of which is a small faucet and spigot, or tap. The oil being put into this vessel is allowed to run slowly into the mortar in which the amandine is being made, just as fast as the maker finds that he can incorporate it with the paste of soap and syrup; and so long as this takes place, the result will always have a jelly texture to the hand. If, however, the oil be put into the mortar quicker than the workman can blend it with the paste, then the paste becomes "oiled," and may be considered as "done for," unless, indeed, the whole process be gone through again, starting off with fresh syrup and soap, using up the greasy mass as if it were pure oil. This liability to "go off" increases as the amandine nears the finish; hence extra caution and plenty of "elbow grease" must be used during the addition of the last two pounds of oil. If the oil be not perfectly fresh, or if the temperature of the atmosphere be above the average of summer heat, it will be almost impossible to get the whole of the oil given in the formula into combination; when the mass becomes bright and of a crystalline luster, it will be well to stop the further addition of oil to it.

* Simple syrup consists of 3 lbs. of loaf sugar, boiled for a minute in one pint, imperial, of distilled water.

† It is made of lard and potash.

This and similar compounds should be potted as quickly as made, and the lids of the pots banded either with strips of tin-foil or paper, to exclude air. When the amandine is filled into the jars, the top or face of it is marked or ornamented with a tool made to the size of half the diameter of the interior of the jar, in a similar way to a saw; a piece of lead or tortoise-shell, being serrated with an angular file, or piece of an "old saw," will do very well; place the marker on the amandine, and turn the jar gently round.

Olivine.—Gum acacia, in powder, 2 oz.; honey, 6 oz.; yolk of eggs, in number, 5; white soft soap, 3 oz.; olive oil, 2 lbs.; green oil, 1 oz.; otto of bergamot, 1 oz.; otto of lemon, 1 oz.; otto of cloves, ½ oz.; otto of thyme and cassia, each, ½ drachm. Rub the gum and honey together until incorporated, then add the soap and egg. Having mixed the green oil and perfumes with the olive oil, the mixture is to be placed in the runner, and the process followed exactly as indicated for amandine.

Honey and Almond Paste.— (Pâté d'Amande au Miel.)—Bitter almonds, blanched and ground, ½ lb.; honey, 1 lb.; yolk of eggs, in number, 8; almond oil, 1 lb.; otto of bergamot, of cloves, each, ¼ oz. Rub the eggs and honey together first, then gradually add the oil, and finally the ground almonds and the perfume.

Almond Paste.—Bitter almonds, blanched and ground, 1½ lb.; rose-water, 1½ pint; alcohol (60 o. p.), 16 oz.; otto of bergamot, 3 oz. Place the ground almonds and one pint of the rose-water into a stewpan; with a slow and steady heat, cook the almonds until their granular texture assumes a pasty form, constantly stirring the mixture during the whole time, otherwise the almonds quickly burn to the bottom of the pan, and impart to the whole an empyreumatic odor.

The large quantity of otto of almonds which is volatilized during the process, renders it essential that the operator should avoid the vapor as much as possible.

When the almonds are nearly cooked, the remaining water is to be added; finally the paste is put into a mortar, and well rubbed with the pestle; then the perfume and spirit are added. Before potting this paste,

as well as honey paste, it should be passed through a medium fine sieve, to insure uniformity of texture, especially as almonds do not grind kindly.

Other pastes, such as Pâté de Pistache, Pâté de Cocos, Pâté de Guimauve, are prepared in a similar manner to the above.

Almond Meal.—Ground almonds, 1 lb. ; wheat flour, 1 lb. ; orris-root powder, ¼ lb. ; otto of lemon, ½ oz. ; otto of almonds, ¼ drachm.

Pistachio Nut Meal, or any other Nut.—Pistachio nuts (decorticated as almonds are bleached), 1 lb. ; orris powder, 1 lb. ; otto of neroli, 1 drachm ; otto of lemons ½ oz. Other meals, such as perfumed oatmeal, perfumed bran, etc., are occasionally in demand, and are prepared as the foregoing.

All the preceding preparations are used in the lavatory process as substitutes for soap, and to "render the skin pliant, soft and fair."

Emulsin au Jasmin.—Saponaceous cream, 1 oz. ; simple syrup, 1½ oz. ; almond oil, 1 lb. ; best jasmine oil, ½ lb.

Emulsin a le Violette.—Saponaceous cream, 1 oz. ; syrup of violets, 1½ oz. ; best violet oil, 1½ lb.

On account of the high price of the French oils, these preparations are expensive, but they are undoubtedly the most exquisite of cosmetiques.

Shaving Paste.—Preparation 1.—Naples soap (genuine), 4 oz. ; powdered castile soap, 2 oz. ; honey, 1 oz. ; essence of ambergris and oils of cassia and nutmegs, of each, 5 or 6 drops.

2. White wax, spermaceti and almond oil, of each, ¼ oz. ; melt, and while warm, beat in 2 squares of Windsor soap previously reduced to a paste with a little rosewater.

3. White soft soap, 4 oz. ; spermaceti and salad oil, of each, ½ oz. ; melt them together, and stir until nearly cold. It may be scented at will. When properly prepared, these pastes produce a good lather with either hot or cold water, which does not dry on the face. The proper method of using them is to smear a minute quantity over the beard, and then to apply the wetted shaving brush, and not to pour water on them, as is the common practice.

CANDY-MAKING.

THE SHOP FRONT, Etc., Etc.

It is not needful perhaps to dwell long upon the necessity of a candy-seller's shop having a neat and attractive appearance. This is so well understood that there is apt to be no want of care in regard to it. The scales and counter should be bright and clean; the vessels containing the candies should be, if paper—of clean paper—and, if glass, they should show the care and attention of the shop-keeper in their bright outsides.

Advertising is the great thing needed by the confectioner; and whether he gets that by the position of his shop, where his goods may be seen of many without any effort on his part, or whether he challenges the attention of the public by some device in his window, or by a series of catching signs, or by what has proved more effective than anything—the sight of a workman making candy in the pan, or pulling "Old-fashioned Molasses Candy" in full view of the public—all are only means of advertising, or of calling attention to his wares. The latter plan, the workman in full view, has proved the most certain means of attracting the public eye; and we have in remembrance at least two instances of firms having risen from the slender capital of a few dollars to a large wholesale trade by the use of this device. The public is curious about most mechanical operations, and people will stop to see almost anything done in the street or in full view of the passer-by, especially if the performance requires some particular knowledge.

Special candies have a large run in some localities. The candy-maker must watch evidences of favor and disfavor, and when he gets an inkling from the public that he is on the right road he must drive it. The fortunes that have been made out of Pease's Hoarhound, Brummel's Cough-drops, etc., etc., show how one can use a popular taste, weakness or predilection, or whatever you would choose to call it.

There is probably only one more precaution—give no inferior or stale goods. Having a proper situation, and with fair attention to business, there is no occupation which holds out a better prospect of ample reward than that of the candy-maker.

The profits of the candy-maker ought to be generally not less than 100 per cent., and when the business is of the cheaper candies it should be more. That is, one dollar's worth of molasses and bicarbonate of soda should produce not less than two dollars' worth of candy when sold at retail. The dollar so gained is small enough to pay for the use of tools, rent, firing and labor of the candy-maker.

By the exercise of a little ingenuity, the local candy-maker can often make a good show and increase his sales. Candies which he does not make he can buy in quantity, and put into handsome fancy boxes, which he can also buy from the box-maker. These generally sell well in the holiday season, though for the rest of the year, when people buy for themselves and not for presents, they want candies without the addition of costly packages. They are then content with the plain boxes made by the envelope-makers or the oiled paper now in use for all the molasses candies.

This oiled paper can be made by any one. Take your paper cut to the size desired. Melt some lard, or, what is better, use sweet oil, and with a varnish brush go over one side of your paper lightly. Then lay it between unoiled sheets of the same paper, which you keep for this purpose. Keep on until all your

paper has been oiled and put between the sheets kept for that purpose. Put away for five or six hours. When you take out your paper you will find that there is no loose oil to come off upon the fingers, and yet the candy will not adhere in the way which was formerly so wasteful and exasperating to the youthful buyer. Very little oil should be used.

SUGAR BOILING FOR CANDY.

Sugar is boiled more or less according to the kind of candy to be made. A knowledge of what sugar boilers call the degrees of sugar boiling is necessary for some of the operations of candy-making.

The sugar is always mixed with water, say in the proportions of 3 pints water to 7 pounds sugar. If the sugar is loaf sugar in any of its varieties it need not be clarified, but white, box or Havana sugar, Confectioners' A, or any grade inferior to this, the sugar should be clarified, unless the color of the candy made is no object.

1. DEGREE OR SMALL THREAD.

The sugar and water being mixed, are brought to a heat of 215° by Farinheit's thermometer. The syrup is then smooth, slippery if a little is applied to the ball of the thumb, and if touched with the fore-finger it will pull out into a *small thread*, which gives the name to it.

2. When the syrup reaches 230° by the thermometer and the thumb and fore-finger being used as before, the thread becomes longer and the syrup clings more. This is the Large Thread.

3 and 4. At 232° we have the Little Pearl, and at 233° Large Pearl, which are really only *Larger Thread*, and are tested as in the second degree. The threads pull out longer. For some of the operations of the

confectioner it is useful to know these degrees of boiling, but for most of the work the first two degrees and the next three are sufficient.

5. At 235° of the thermometer a skimmer or slice with holes in it, if dipped into the boiling sugar, drained and turned—flirted quickly by a turn of the wrist, or if blown upon by the breath, will show feathery films of sugar or bladders. This is called the *Blow* or *Feather* degree.

6. At 240° of the thermometer the sugar becomes tough, and reaches the candy degree or "Ball." To see whether it is right, take out a little, dip quickly into cold water (ice-water, if possible), and try to roll it around between finger and thumb. If it balls readily and can be moved about between the fingers without adhering to them it has attained the "Ball" degree, and is ready for any operations in which that degree is necessary.

7. THE CRACK.

This is reached when the thermometer shows the sugar to have reached a heat of 252°. Take out a little of the candy as before, dip into cold water and bite. If it crack short, it is ready. Take care not to leave the sugar on the fire while trying this, or you may boil your sugar too much. The "Crack" degree is perhaps more frequently used in confectionery than any other degree.

8. CARAMEL, OR 260° BY THE THERMOMETER.

This is shown by the sugar changing color and turning brown, or, as we commonly say, it is "burnt sugar." It is used in many operations beside that of the confectioner, being made in large quantities for the use of "compounders" of brandies and "ameliorated" spirits of various kinds. In confectionery it is used for ornament mainly, etc. As soon as the sugar begins to turn brown, take the kettle from the fire

and set the bottom into a pan of cold water to check the heat at once, or it will become unusable.

We have given here the thermometer test as well as the practical and usual way of ascertaining the condition of the boiling sugar. For daily work, the best way is to try the syrup with the thumb and fore-finger up to the "Ball," and then with the cold water, as described. These methods are much quicker and less "messy" than it would be to have a thermometer. A little practice will soon give the requisite skill.

CLARIFYING SUGAR.

Occasionally sugar made into candies, "creams" or syrup will need clarifying. This is readily accomplished by the following process:

Beat up well the white of an egg with a pint of water, and pour it into a clean brass or copper kettle. Then put into the kettle ten pounds sugar, mixed with a quart of water. Put on the stove and heat moderately until the scum rises. Remove the kettle and skim off the top, then place on the fire again until the scum rises again. Then remove as before from the fire and skim again, and so continue until no scum rises.

This recipe is for good brown or yellow sugar; for soft white sugars, half the white of an egg will do; and for refined or loaf sugar a quarter will do. The quantities of sugar and water are the same in all cases. Loaf sugar will generally do for all candy-making without further clarification. When clarification is needed it will be pointed out in each recipe.

Where the blood of beef cattle is obtainable, it can be used instead of the white of eggs. But this would be only a question of economy, either of time or money. The eggs are, on the whole, more convenient. Blood is used in the proportion of half a gill to ten

pounds of sugar. It is mixed with a half pint of water and put in the boiling kettle before putting in the sugar, which is diluted with water, as before described, and heated and skimmed as mentioned before. "Animal charcoal," also called "bone black" and "ivory black," aids the operation if a very nice sparkling sugar is desired. If bone black is used, the syrup must be filtered through a filtering bag of flannel or felt. The filtering is repeated until the syrup runs off quite clear. But in all small operations the white of egg is sufficient. The bone black is used in the proportion of one ounce to every pound of sugar. A little less will answer the purpose very well, however.

SUGARS USED.

Brown or Yellow sugars are used for caramels, dark-colored cocoanut, taffee and pulled molasses candies generally, in combination with molasses.

Havana or Box sugar is the cheapest grade of white sugar. It is but one remove from the brown.

Confectioners' A is superior in color and grain to the Havana. It is a centrifugal sugar—that is, it is not reboiled to procure its white color, but is moistened with water and then put into rapidly revolving cylinders. The uncrystalized syrup or molasses is whirled out of it, and the sugar comes out with a dry white grain.

Icing or Powdered Sugars.—This is powdered loaf sugar. Icing can only be made with powdered sugar, which is produced by grinding or crushing loaf sugar as fine as flour nearly.

Granulated Sugar.—This is a coarse-grained sugar, generally very clean and sparkling, and fit for use as a colored sugar in crystalized goods and other superior uses.

Crushed Loaf Sugar and Chopped Lump.—These are double refined loaf sugars, both the same in quality, except that one is broken between rollers and the other cut or chopped into cubes. They are fit for the best work of the candy-maker, but are no better than the granulated sugar as made in New York.

GLUCOSE—GRAPE SUGAR.

Glucose is now used by nearly all large candy manufacturers. It is a sugar made by pouring sulphuric acid (diluted) upon starch, and afterward neutralizing or "killing" the free acid with chalk or powdered lime, which falls to the bottom. The result is a sugar or thick syrup similar to honey, or the sugar found in grapes.

It is considered by many that if the acid is all killed by the chalk or lime, that this glucose or grape sugar is harmless, while others, and among them many physicians, think that it increases the tendency to diabetes, a distressing disease supposed to be caused by an excess of grape sugar in the blood. Whether this is so or not, confectioners generally use glucose in candy-making for two reasons: it gives the hard boiled candies a clear appearance, and it costs only half the price of cane sugar. The proportions for using are, to every five pounds cane sugar one pound glucose. We omit it from our recipes, partly because of the doubt as to its wholesomeness, and partly because the goods made by its aid are really not so sweet and delicate in flavor as if made of all cane sugar. It is, however, used in all the cheap candies.

CRYSTALIZING.

This is an operation only needed in finishing some confectioners' productions, such as gum-drops, brandy-

drops, etc., and fruits. The mode of operation is this: The crystalizing syrup is sugar that is boiled a little below "large thread"—that is, brought to a heat of about 223° to 225° Farinheit, and kept there a minute or so. This syrup is then allowed to cool. The objects to be crystalized are placed on a netting of wire, within any convenient vessel, and the cooled syrup poured over them. They are left in the syrup about twenty-four hours, taking one out to see how the work is proceeding every hour or two. The vessel containing the syrup is put into the "stove," or drying-room, or within the screen (see Stove). When the crystalizing has gone far enough to make the outside of the drops or fruits have a sparkling appearance, the netting is lifted out, adhering syrup knocked off, a little shake given the goods, and then they are put into the drying-room again for an hour or two. In large operations, vessels are prepared which will hold succeeding sheets of netting one over the other, close enough together to allow the syrup to cover the articles completely. The syrup may be used more than once, but will need renewing, of course. The crystalizing vessel should be covered with a damp cloth—to prevent a pellicle or skin forming over the syrup.

The *explanation* of the process is, that a portion of the sugar in the syrup dries or crystalizes on the articles suspended in it. These crystals, as all crystals do, have a shiny look, and give the candies a bright attractive frosting of sugar, which is very alluring to the eye.

IMITATION CRYSTALIZING.

Many of the descriptions of drops sold are sold as crystallized goods without being so. The process is very simple. Sift them well, put them into a large clean pan; have ready a rather weak solution of clear

gum water, in which dip your right hand, and with the gum water that clings to it work over the drops. When they are all equally wet, but only slightly so, spread over them, according to quantity, granulated sugar, shake them up with this two or three minutes, put them into trays in the stove t dry; when dry, sift them.

COLORS.

For all purposes, it is better for the candy-maker to purchase his colors ready made, as they cannot, on the small scale, be produced any cheaper than they can be bought of large makers. The colors should be vegetable, for it is no doubt true, that mineral colors, merely from the fact of their being mineral, are harmful, though in some cases not actually poisonous. Analine colors, though very bright, should be carefully avoided. They are all dangerous, although their evil influences cannot be traced. The French government, which is careful of the health of its citizens and the reputation of its manufactured products, allows for the use of confectioners—

Indigo, Prussian Blue, Ultramarine,	For **Blue.**
Cochineal, Carmine, Carmine Lake,	For **Red.**
Saffron, French Berries, Persian, Turmeric, Fustic,	**Yellow.**
A mixture of one of the Yellows and one of the Blues,	**Green.**

The ultramarine, we have no doubt, is hurtful, as it is an indigestible substance, lying inert in the stomach, but few French people indulge in prettily-colored candies. These handsome goods are mainly intended for exportation. Of the vegetable colors in the market, we believe those of the English makers, W. J. Bush & Co., to be quite innocent and brilliant enough for the candy-maker's use. These colors can be purchased of most druggists and supply houses.

If, however, the candy-maker desires to experiment in making his own red —the most frequently used color —he may put into a clean copper or porcelain saucepan one-quarter pound cochineal in powder, with 3 pints of water; allow to boil; add 2 ounces alum in powder or cracked small very gradually, and stir. Boil a minute or two; add gradually 2 ounces powdered soda; boil again a couple of minutes, and keep stirring. Finally, add one-quarter pound cream of tartar; boil two or three minutes more, and strain through a fine hair seive or coarse clean muslin. The latter is not good for a strainer, as it takes up so much of the color. Set away in a tightly-corked bottle for use. If this color touches tin or iron it will turn brown.

For yellow, saffron, French or Persian berries may be boiled or infused like tea, and boiled down until it is of the required shade.

Blue can be thus prepared: In a stoneware jar of 3 gallons capacity, put a quart, or about two pounds and a half of sulphuric acid. To this add powdered indigo gradually, stirring all the while with a glass rod until the whole forms a pasty mass. It will require about a quarter pound of indigo. The jar should stand in a pan of cold water, as the mixing develops much heat and swells very much while going on. Avoid breathing the fumes. After thorough mixture, allow to stand an hour or more, to insure perfect solution of the blue. Then fill the jar with cold water, and stir around with the rod. Keep this two or three hours.

Then pour it out into a glass jar of the same size. Now crack up some common potash and drop it in small lumps into the blue water. This potash takes up the sulphuric acid, and leaves the blue in fine particles drop to the bottom. Keep adding potash as long as the blue continues to fall; when no more blue particles fall, stop adding the potash and let the mixture rest an hour or two, and then pour off the waste. The bottom will be your blue coloring, which can be dried for use. Kept in an air-tight jar, it will remain good for an indefinite period. It mixes with water in any proportion. In the proportion in which it would be used to color confectionery it is harmless, no ill effect having yet been traced to it, though indigo itself is a medicine of decided character. The blue is somewhat muddy when used in candy.

Green, as already stated, may be made of the blue and yellow mixed—purple, of the red and blue mixed. Brown may be made of *burnt* sugar, so called, or caramel, which is sugar boiled until it assumes a dark-brown color. By mixing this with water, all shades of brown may be made. Mixing chocolate with water will also give a good brown.

Black is ivory or bone charcoal, ground fine and mixed with a little gum arabic. It is used in the candy as well as on it—that is, toy candies are sometimes painted with it, mixed with syrup. The animal charcoal is harmless entirely either way.

But we repeat again, it is generally cheaper to buy any of the colors required, wherever there is a druggist convenient.

The color is mixed by many on the slab of marble or iron just after the candy is poured out on the slab. For this purpose, the colors should be rubbed up with good sweet oil to about the consistency of paint or cream. Oil assimilates readily with the candy. A sufficient quantity of the color having been taken (and this must be a matter of judgment and practice), it is worked into the hot candy with the palette (large)

knife and by doubling and rolling the candy. In some candies like the various named "Rocks" (not that usually called *Rock Candy*), which consists often of a basis of pulled yellow or white candy, with a covering or skin of colored candy, the method is as follows:

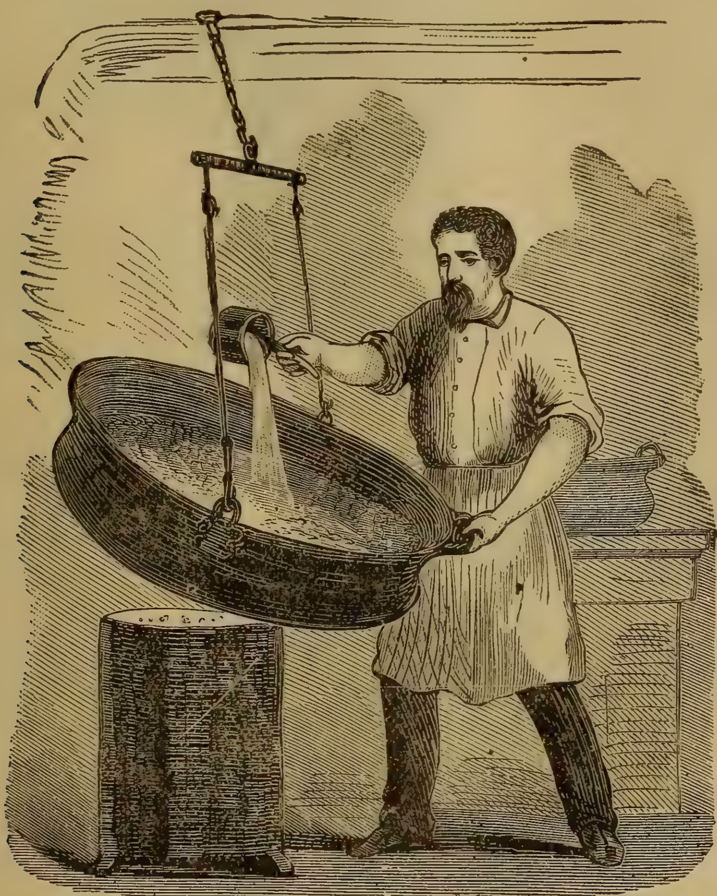
The first and larger part of the boil is poured out upon the slab, and a small portion of the boil is left in the pan. The color is added to this latter portion, worked around with the palette knife, and placed where it will just retain its heat for a little while. The candy on the slab is then taken up, pulled as quickly as possible, and laid or coiled down again on the slab; the colored candy in the pan is heated for about one minute and poured over the white, pouring rather slowly so as to let it cool and set on the outside of the white. In such cases the white candy is not always pulled, but is often left simply boiled.

Another plan for "casing" candy, as this operation is sometimes called, is to prepare the uncolored candy on the slab and put it into the shape required, leaving a portion with a little color in the pan, as in the preceding operation. Then pour out the colored candy on the slab, and when it is cooled a little, with an oiled rolling-pin flatten out into a sheet of the required thickness. This sheet is then laid upon or around the uncolored candy as may be required. The two, if still sufficiently warm, will adhere, and can then be worked into any shape desired. If they do not stick to each other, the top of the clear candy may be moistened with a brush or sponge lightly, after which put in the colored sheet the heat of the sugar drying out the water.

TOOLS.

The tools of the candy maker who works on the small scale, and on some of the most popular goods, too, may be quite few and simple. An ordinary range

fire, a brass or copper kettle, always kept very clean, and the tin pans to contain the common kinds of candy, are sufficient for a certain trade. To pull candy a large hook (see modes of working), conve-

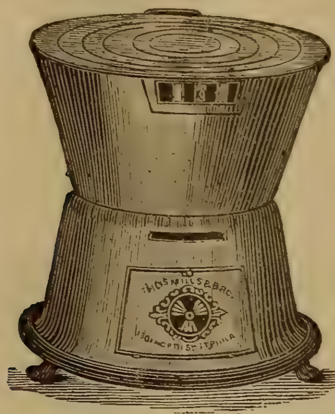


1.—Swing Pan.

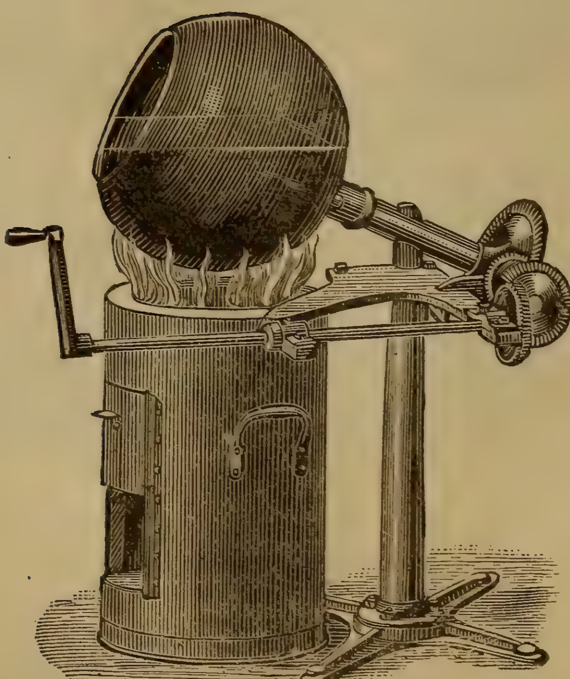
niently placed about the height of the eyes, is needed; and stick or ornamented candies cannot be made without a slab or marble upon which to work them.

In addition to all this, there is wanted a long knife to divide the candies into convenient sizes for selling. But when the trade becomes a little larger, it is

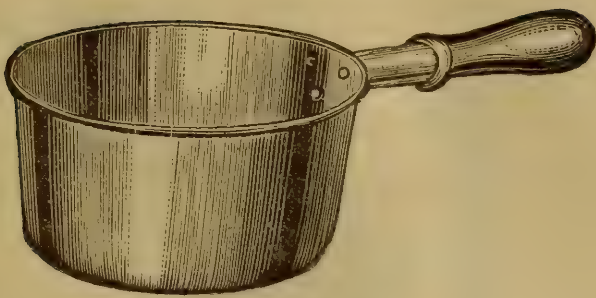
cheaper to have regular confectioners' tools and machinery. A few of these tools we shall describe.



2.—FURNACE.

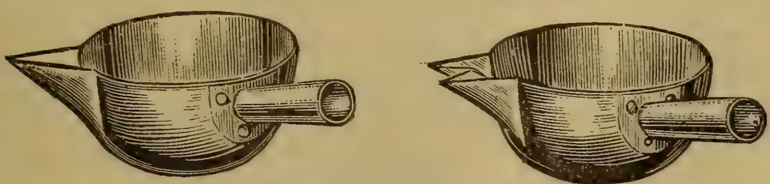


3.—REVOLVING PAN



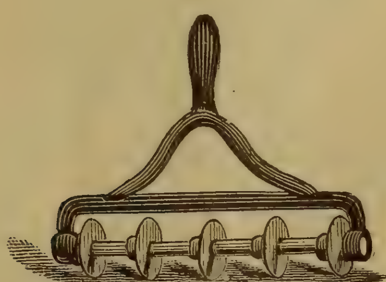
4.—BATCH PAN.

First, perhaps, in order is the FURNACE. This, as now made (fig. 2), has the lid made in several rings, so that the amount of heat can be increased or diminished at pleasure.



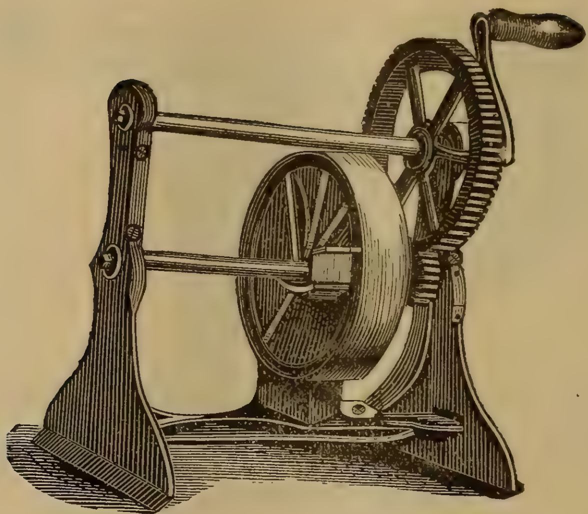
5.—MINT DROPPERS.

Then next comes the SWING PAN (fig. 1). This is swung upon two chains attached to a swivel, so as to admit a peculiar motion while over the fire, when de-



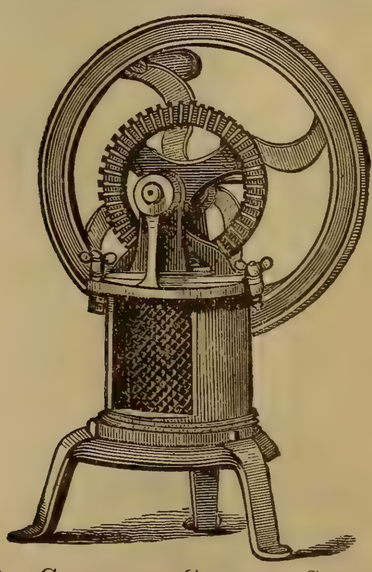
6.—HOARHOUND CUTTER.

sirable to sugar burnt almonds, or to do other pan work The motion is backward and upward. Cost, $6 to $12.



7.—Cocoanut Grater, Large.

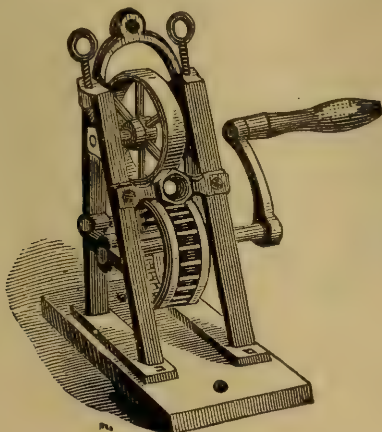
There is also an Oscillating Pan, moved by machinery, which imitates the motion of the hands, and Revolving Pan, both of which are calculated to do



8.—Cocoanut Grater, Small.

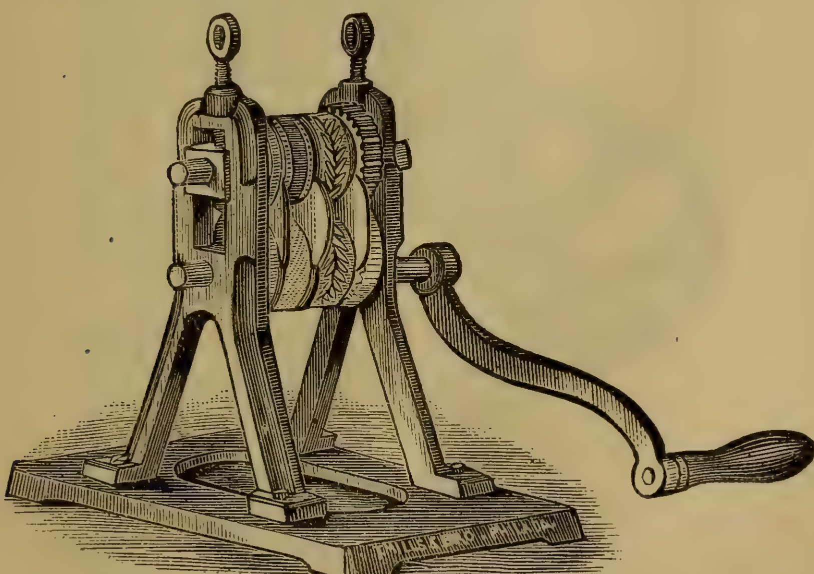
the same kind of work. The first is arranged to be kept hot as well as to be moved by steam, and is, of

course, only available in large works. The second can be used by hand, the pan extending over the fire.

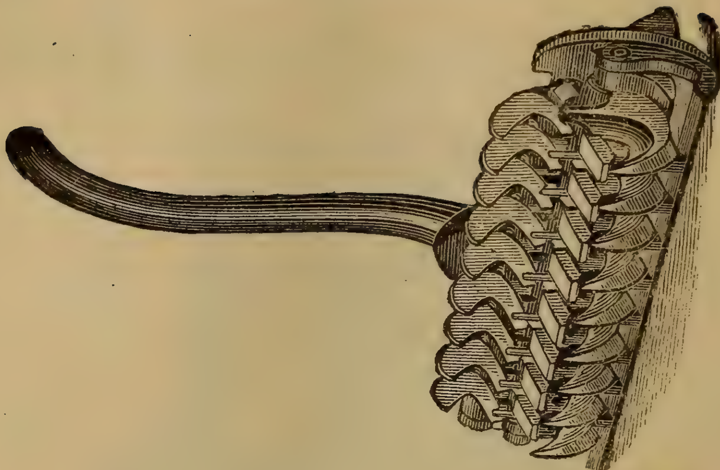


9.—Lemon Drop Cutter.

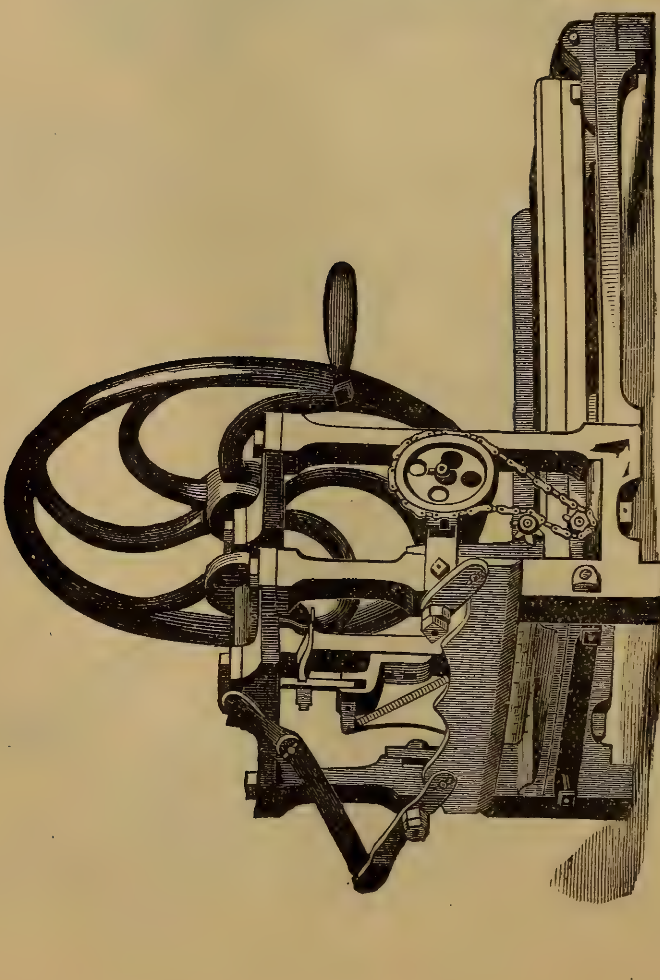
The Batch Pan is a kettle with a handle, and is used to boil the sugar in, or to keep the boiled sugar hot, for use in other operations at the pan. Price, $6 to $10. Usual size, 12 in. diameter; 11 to 12 deep.



10.—Plait Machine.



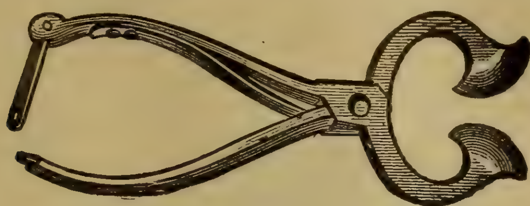
11.—Ball Cutter.



12.—Candy Cutting Machine.

The Toy Pan is made to pour boiled sugar properly prepared into moulds of toys. $3.50 to $4.50. Size, one-half gallon to one gallon.

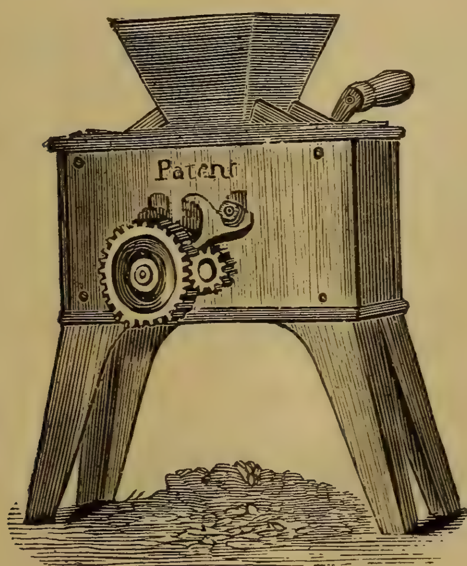
The Mint Dropper is made double and single. It is



13.—Candy Tongs.

used for making mint and chocolate drops, and any similar operations. $2 to $3.50.

Hoarhound and Caramel Cutters save much time in dividing the candies into convenient sizes for sale.

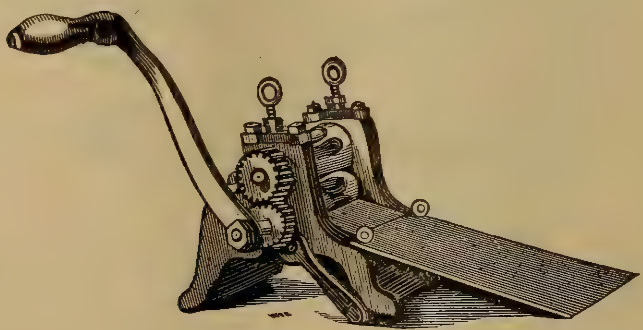


14.—Almond Peeler.

They are made in two styles, with movable knives and with fixed divisions. Those with fixed knives are like illustration fig. 6, and cost $5, while those with movable cutters cost $7. The former have the knives

arranged at distances of one-half, five-eighths, three-fourths, seven-eighths, one inch, one and one-quarter, one and one-half, one and three-quarters and two inches.

COCOANUT CANDIES are so popular that when well



15.—TOY CUTTING MACHINE.

made in a populous neighborhood the trade soon becomes so large that it becomes sheer waste to grate the nut by hand. It is then that the

COCOANUT CUTTER OR GRATER becomes an economical investment. These range in price from $16 to $150,

16.—PAPER FRINGER.

the latter with steam fixtures for large works. The same machine, arranged only for hand power, costs $75, and will grate seventy-five nuts per hour. The smaller machines, at from $16 to $22, will fully meet the wants of a moderate business.

Lemon Drop Cutters run in price from $13 to $40. Their use is obvious, and the difference in price is caused by a variation in the device for drops of a fancy or peculiar shape.

The Plait Machine.—By passing flat candy strips, finished up to the proper point, through this machine, it gives it all the appearance of having been plaited, which, in the eyes of many consumers of sweets, is quite a desirable quality.

Ball Cutters.—This is a hand machine for making what in some places are known as Jackson balls, in others as bull's eyes, according to the fancy of the locality. The machines, with all improvements, cost $15. The diameter of the ball may be varied from thirteen-sixteenths of an inch to one and one-eighth, and the size desired must be given when ordering the machine.

The Candy Cutting Machine is used for cutting cocoanut strips and other mixed fruit and nut candies. They are made rather too large for any but a lively business, the smallest costing $80, and the largest $300.

The Candy Tongs are used for cutting the candy into convenient pennyworths in small establishments. They cost $2.

The Almond Peeler saves considerable labor. One warranted to peel forty pounds of almonds per hour costs $25.

The Toy Cutting Machine.—This is one in which figures are impressed upon a cylinder. It cuts candy into forms of animals, etc., with great rapidity. Costs from $40 upward, and is a great labor saver, but is of use mainly to those who sell by wholesale; few retailers can sell candy toys enough to make it worth while to run a machine.

Besides these machines, there are others which either facilitate the production of candy or are absolutely necessary to special shapes or patterns.

There are moulds for toys made by hand, etc., etc.

These can all be found at the stores of firms who make a business of supplying every kind of machine needed by the confectioner, while other houses supply him with all the smaller matters, in the way of fancy paper, mottoes, plaster moulds, etc., etc., etc.

Among the useful things for even a small wholesale trade is a

Paper Fringing Machine.—This costs about $20, and will be found to save quite a good deal of time in the course of the year.

FLAVORS.

Generally it is most convenient and economical to purchase the essences required for flavoring. Essence of peppermint, indeed, can be obtained in no other way, as the business of distillation is a distinct profession. Vanilla, clove, cinnamon and lemon may be prepared as follows:

Vanilla.—Crack up two ounces of vanilla, and put it into a wide-mouthed bottle, which will hold nearly a quart. Pour over the vanilla a pint and a half of alcohol, of the kind called "Cologne Spirits." This kind of alcohol is free of flavor, is of nearly uniform strength, and is for sale by all apothecaries. Cork the bottle, give it a good shake, and put it away. Give it a shake once or twice a day, for a week. Then filter into another clean bottle, for use. Keep tightly corked. This will make an essence costing about $2.50 for the pint and half, but it will be much stronger than the purchased article. If you desire to weaken it, put in more alcohol.

Clove and cinnamon essence are made in the same way. Essence of lemon is made by grating off the yellow portion of five or six good-sized lemons—the white is no good—the essential oil of the lemon residing in the yellow outside. Take this part so grated off, and pour over it a pint and a half of "Cologne

Spirits." Let it remain a few days, and filter for use.

All these flavors, and occasionally some others, like rose water, are used in candy-making. Rose essence must be purchased. Usually about seven drops to a seven pound boil are amply sufficient. But this is a matter that must be left to the candy-makers' experience, as much depends upon the strength of the material which he is using. It is better to under-flavor the first time than to overdo it.

The essences are applied to the candy after it is poured upon the slab. A little hole is made into the middle of the candy, the flavor poured in, and the candy doubled over. The candy is then worked and the flavor rapidly penetrates to all of its parts. If applied in the boiling-pan the essence would boil away for the most part—in other words, it would simply waste.

THE STOVE.

This is a drying-room or closet called "stove" by the professional confectioners. It is needed in finishing some goods, and is heated by waste heat from the main fire, or contains a small furnace or wood stove. In large works steam heat is used, and in small establishments a three-sided screen is put near the fire, the fourth side being toward the fire. This retains sufficient heat for many purposes, and, indeed, for all which a small business requires. The heat required varies for different goods. Burnt almonds, lozenges, etc., require 80°, and brandy gum drops 100°. Regular candies 100°.

MODES OF WORKING.

In the ordinary candies made in the pan and kept flat, there is not much room for ingenuity or the dis-

play of skill. All that is wanted is careful observation of the right degree of boiling and neatness in putting the goods into such shape as to give them an agreeable appearance.

Flat sticks of one color are made by simply pouring out upon the slab, and when sufficiently cool they are rolled with a rolling-pin to the required thickness, and then creased with a palette-knife or the hoarhound cutter (running only one way). Round sticks of the same kind are made by taking a convenient portion and rolling it into first a thick round body, and then rolling it thinner and thinner until of the required diameter, when it is cut off by a sharp knife. Plaited or pattern candies must be made in a machine such as described under the head of tools.

Striping requires experience. The colored sugar for stripes is prepared as described under colors, the uncolored sugars being rolled into a thick roll. If the stripes are straight, they are laid along this roll quite straight, and then rolled out thin to the required size; but if they run around the stick like the colors around a barber's pole, the stripes are first laid upon the slab in a diagonal or *bias* direction, while the uncolored candy is rolled straight backward from the workman, the left hand of the uncolored roll beginning upon the end of the stripes nearest the workman. When the end is reached the stripes will be running spirally around the uncolored candy. The whole is then rolled out thin, as before described. The stripes are prepared from the colored candy by pouring out on the slab, rolling out and cutting into strips of the proper size. Take care, as before said, that these stripes are much larger than they are to be finally. The rolling out will reduce them.

Candies marked on their interior with words and devices are made by first forming a core of uncolored candy, then placing around it the device required, larger than the intended size, and finally casing this with more uncolored candy. The whole is then rolled

out to the required size. The formation of letters, words, stars, etc., in the interior of candy sticks is all managed in this way, and its success depends entirely upon the ingenuity and mechanical skill of the workman.

Flat stripe sticks are of course easily made, as the striping can be laid on a thick mass of uncolored candy, which is then rolled out as thin as required, and divided up into sticks. A variation of this work is seen in the twisted candies. This twist generally consists of one turn of the wrist, holding each end of the stick between the forefinger and thumb of each hand. It is rapidly and easily done.

All these operations are conducted while the candy is of the consistence of stiff dough, require dexterity and experience, the hands being kept oiled with sweet oil.

Candy-pulling, which is necessary to whiten some candy, and to make it tender also, may be done by the hand (well oiled with sweet oil or butter) when the quantity is small, or on a large hook placed at the height of the eye. The hook should be a blunt one and large enough to admit rolls of four or five inches in diameter with ease. The workman rolling up his candy upon the slab so as to be in convenient form for throwing upon this hook, throws it up, and catching both ends gently pulls the candy toward himself, he being some three and a half or four feet from the hook. As the candy lengthens out as far as is safe, he brings *both* hands together and throws back over the hook the *doubled* strand of candy, so to speak, which he has just pulled out. This is continued until the candy is white enough, when it is taken off the hook and formed into such shape on the slab or otherwise as is desired. Frequently pulled candies are simply taken off the hook and coiled down upon or into an oiled pan. Sometimes they are cased with a red candy, which is put over them after they are pulled and coiled away. These are called *Rocks*, and are spoken of elsewhere.

This candy-pulling is intricate in description, but is perfectly simple in operation, and it would not take any one any length of time to acquire the knack having once seen it.

17.—Candy Pulling.

MOLASSES CANDIES.

These are the easiest to make. They can be produced at a very low cost, and they sell readily, especially to the juvenile population.

1. Old-Fashioned Molasses Candy.—This is made of West India molasses—in other words of the poorer

molasses, as there is a flavor about this kind of molasses when boiled which is in itself an attractive quality. But it can be made of New Orleans molasses, or Sugar-House drips, or coffee sugar, if desired.

Into an eight-quart kettle put two quarts of molasses and boil over a slack fire from twenty-five to thirty-five minutes. Test it after it has boiled twenty minutes by taking some out on the end of a clean splinter or spoon, and dipping it into cold water. If it harden quickly and break short between the teeth it is boiled enough. This is "boiling to the crack" When the molasses is boiled to this point, put in a teaspoonful of baking soda, and stir it all well, and pour it out into oiled or buttered tins. If you are making a larger quantity, pour upon a marble slab. When somewhat cooled, take up the candy with your hands well buttered or oiled, and pull and double-pull and double, and so on until the candy is white. Small quantities can be pulled simply in the hands, but large quantities are thrown over a strong hook, the candy pulled, doubled, and the two strands so made thrown back continuously by a dextrous motion until it is white, or whitish yellow at any rate, in which condition it is old fashioned molasses candy. (See modes of working.)

2. Yellow Jack.—This is now out of fashion in many parts of the country, but is still a favorite in out of the way places. It is only "Old Fashioned Molasses Candy" cut in strips and rolled or twisted. Sometimes it is made by boiling about one quarter as much sugar, separately, to the crack, (see Sugar-Boiling), pouring it on over the pulled molasses candy, cutting it into strips when cool enough, and twisting up.

3. Another Molasses Candy (White).—

4 lbs. light brown sugar.

1 quart West India molasses. Boil to the crack, and test by cold water as before. Add a teaspoon-

ful of baking soda. Pull on the hook, or if in small quantity between the hands, until it is white.

This can be made still more white by using white sugar (Havana, granulated or confectioners' A).

4. Molasses Candy, Soft Boiled.—

1 quart molasses.
1 oz. butter.
1 teaspoonful baking soda.
1 drop lemon essence.

Boil to the *ball*. Put on ice in summer to cool sufficiently to cut and pack in prepared (oiled) paper.

5. Everton Taffey.—

Sugar (light brown), 1 lb.
Butter, 2 oz.
Water, ½ gill.

Boil sugar and water to the *ball*, then add the butter and boil to the crack. Add five drops essence of lemon; stir quickly, and pour into oiled or buttered tin pans, square. Divide the taffey before quite cool with knife or hoarhound cutter. (Oiling pans is best done with good varnish brush; oil lightly, but thoroughly.)

6. Another Taffey.—

West India molasses, 2 quarts.
Butter, 4 oz.

Boil to the crack; add the butter; boil a few moments more; add ten drops of any essence desired; stir, and pour into oiled tins.

7. Ginger Taffey.—

Granulated sugar, 7 lbs.
Cream tartar, ¼ oz.
Water, 3 pints.

Boil to the crack; add extract of ginger half teaspoonful; stir, and pour into oiled pan.

8. Raspberry Taffey.—Sugar, cream tartar and

water as above. Boil to the crack, and add $\frac{1}{2}$ lb. raspberry jam; stir and boil again to the crack, and pour out into oiled pans.

9. Butter Scotch.—

2 lbs brown sugar.
½ lb butter.

Boil to the crack; add teaspoonful of baking soda; stir, and pour into oiled pans. Mark to the size required before quite cool. When done crack apart with a light tap, and wrap into separate papers.

10. Doncaster Butter Scotch.—

Sugar house syrup, 1 quart.
Loaf sugar, 1 lb.
Butter, 1 lb.

Boil to crack the molasses, sugar and butter; stir, and pour out, roll. Taffey and butter scotch should always be thin, not over one-fourth inch in thickness; thinner is better.

11. WALNUT CANDY.

The kernels of black walnuts being extracted and shaken about in a seive to clear them of their skins as much as possible, put them into a batch pan and pour over them sufficient molasses or sugar boiled as in No. 5 or 6 (taffey), or as in No. 1, to cover them. Stir thoroughly, and pour into square pans an inch or an inch and a half deep. Allow to cool nearly, when it should be divided into strips with a long heavy knife, oiled, or a cocoanut candy cutter. No flavor.

12. PEANUT OR GROUND NUT (GOOBER PEAS) CANDY.

The peanuts should be fresh roasted and then tossed in a seive to free them of their inner skins. Then proceed as for walnut candy (No. 11).

13. Another Peanut.—First remove the shell from the kernel; toss the latter in a seive, and then boil them with sufficient molasses or sugar; boil as in 5 or 6 to the crack. Remove and pour into moulds.

14. Almond Taffey.—Remove the outer shells of sweet almonds, scald the kernels, and remove the skin upon them by slipping them off with the fingers; chop them coarsely. Then fill pans, oiled with sweet oil, or buttered; level up and proceed as in No. 11. Almond Taffey is not usually made so thick as peanut and walnut, and the price charged is higher.

15. Almond Taffey (another).—Proceed as before, but add the chopped almonds to the boiling syrup; boil a few moments more, until it comes again to the crack, and pour. No flavors are to be added.

16. POP CORN CAKE.

Pop Corn Cake is made by chopping the popped and salted corn to the required size, spreading it even in a pan, and pouring on it a thin hot syrup; mixed thoroughly with the hand or a wooden paddle and leveled up to a thickness of one and a half to two inches. When cooled it is flattened out by pressure. For a small trade this could be done in a family cider press or a clothes wringer, set wide. It is a little difficult to chop the popped corn, and for manufacturers a machine is used, which does it rapidly.

17. POP CORN BALLS.

The corn, being popped and salted, and kept as warm as possible, sprinkle over with a whisk broom a mixture composed of an ounce of gum arabic and a half pound of sugar, dissolved in two quarts of water, and boiled a few minutes. Stir the corn with the hands or a paddle thoroughly; then mould into balls with the hands. This makes a good, white ball. If

desired, a red tint may be given by sprinkling with a solution of carmine to the mixture, after it has been balled.

18. Pop Corn Balls, No. 2.—Pour over the warm popped and salted corn the boiled sugar or molasses, boiled to the thread; not to cover it but a little at a time, stirring the corn, which should be kept warm, until it is in a condition to stick together, when moulded by the hands. No flavor should be added in this mixture, as the excellence of this commodity depends entirely upon the united flavor of the corn, salt, and the sugar or molasses.

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19. FIG PASTE.

Most of the Fig Paste sold is only corn starch sweetened, and rolled in powdered sugar. The mode of manufacture is to mix one-quarter pound of the starch with enough cold water to moisten thoroughly, and then to pour hot water thereon, and set upon the fire until it flows thick and clear. At this stage the sugar is added—one pound of confectioners' or any other white sugar, and it is flavored sometimes with a very faint taste of musk or oil of rose, to carry out the idea that it is a Turkish confection, which, indeed, it is, for the fig paste sold in the streets of Constantinople is often no more. In other cases the pulp of figs is boiled separately for fifteen minutes, and is then strained through a coarse cloth and added to the hot starch. The seeds and skin of the figs must, of course, be thrown away, as the beauty of this confection is in its smoothness. Genuine fig paste, which is really not much superior to the imitation, either in consistence or flavor, is made by boiling any quantity of figs, split open, in sufficient water to cover them, for fifteen minutes or more; straining, adding sugar in the proportion of three pounds of sugar to every pint of the fig fluid. Set the dish or kettle into another con-

taining water (like a glue boiler or farina kettle), and set on the fire. When the mass has thickened, by the escape of the water, to the consistency of molasses, pour into one large, square mould, oiled. After it has cooled and hardened, remove and cut into cakes, an inch each way. Roll them in powdered sugar. In fig paste white sugar must always be used. The paste is often colored a faint carmine.

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20. CARAMELS.

5 lbs. sugar.
1 lb. glucose.
1 quart milk.
½ lb. butter.
½ lb. chocolate dissolved in pint of water.

Boil to the crack and pour out on the slab. Divide into squares when nearly cold..

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21. CHOCOLATE CARAMELS (No. 2, Superio

1 lb. sugar, granulated or Havana.
¼ lb. chocolate.
¼ pint cream.
2 oz. butter.
½ pint water.

Put the sugar and water in a kettle that wi allow for the fluid swelling; when it comes to a boi gradually put in the cream, then stir in the butter, anc finally the chocolate dissolved in a little water; wher it is at the crack pour out into shallow plate or on the slab, and mark out with knife or cutter. The choco late may be grated or it may be of the chocolate liquor sold for the purpose by the manufacturers o chocolate.

22. CHOCOLATE CARAMELS (No. 3).

Boil 2 quarts of West India molasses to the crack; when nearly done add 8 oz. granulated chocolate; stir thoroughly, and pour out into oiled or buttered tins. When nearly cool mark off into small squares with a knife or caramel mould.

23. Maple Sugar Caramels.—

5 lbs. yellow sugar.
5 lbs. maple sugar.
1 pint of cream.
½ lb. butter.
1 qt. water.

Boil the sugar and water to the crack; add the cream, and boil up again to the crack; then add the butter, and bring once more to the crack. Pour out, and divide as usual.

24. Cocoanut Caramels.—

½ lb. grated cocoanut (the dessicated article will be found most convenient generally).
1 oz. flour.
3 eggs (white of).
¼ lb. sugar.

Soak the cocoanut, if dessicated, in milk enough to cover it. Then beat up the white of the eggs, add the sugar and flour, and finally stir in the cocoanut. Bake in a moderate heat about twenty minutes. It will be perceived that this is more like a cocoanut icing, but it is called cocoanut caramel, being divided in the same way.

25. Everton Taffey Caramels.—These consist of two pieces of everton taffey, with a portion of cream between them. The cream is that made in 26—Chocolate Creams. The article is not a caramel, but—"anything for a name."

26. CHOCOLATE CREAM DROPS.

These are easily made, popular and profitable. The first requisite in their manufacture is the production of the cream, or interior portion of the *bon-bon*. In small establishments, where sugar-boiling is not usually done, and in which some of the tools may be lacking, the following method of making the cream is pursued:

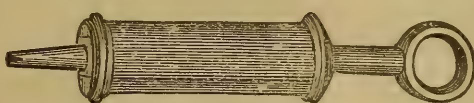
1. A quarter of a pound of picked gum arabic is dissolved in half a pint of hot water, and as much icing sugar, sifted through muslin, added as will make a stiffish paste or dough, which should be worked thoroughly, but with a light hand, and flavored with vanilla.

2. A second method is to make the cream of white of eggs and icing sugar, sifted, and water, omitting the gum. The proportions are: Whites of six eggs; one gill of water; beat up well, and mix with the sugar, flavored with vanilla, until it makes a stiffish mass, which is to be handled subsequently like the cream described in the first method. Some confectioners cheapen the cream by using corn starch in it, which economizes both sugar and eggs, but the result is not so sweet.

3. Still another method used by confectioners in a large way is to boil three and a half pounds of sugar, one-eighth ounce cream of tartar and one-half pint of water, to the *thread*, and while boiling to grain it thoroughly against the side of the sugar boiler with a spoon, constantly and regularly, until it assumes a creamy consistency. This is also done on the slab, which may be warmed by a lamp underneath, with a large pallette knife. By a steady rubbing of this boiled sugar, after the manner in which painters mix their colors sometimes, the sugar becomes creamy, and is then to be flavored as desired, and is run into starch moulds and allowed to set, so as to be ready for the next operation (see below). Vanilla is the best flavor to be used in any chocolate combination.

THE CHOCOLATE.—The chocolate envelope or coating of the cream drops is easily made in the case of the cheaper articles, for street sale, etc. It consists only of the chocolate, dissolved in a farina boiler with a very little water. If a superior article is wanted, a regular chocolate icing is made by dissolving a teaspoonful of gum arabic in a half gill of water; dissolve a half pound of chocolate in a half pint of hot water; pour the two solutions together, and stir in a tablespoonful of sifted icing sugar. Keep warm, and work with a spoon until the mixture is entirely free of lumps, and about the consistency of cream.

Having now your cream prepared, as described in the first or second methods, divide it into equal portions, by forcing it through the tube of a small sausage stuffer, or a machine used by confectioners, called a



18.—CREAM FORCER.

biscuit forcer, which is a bag with a tin nozzle, and cut off equal lengths. These are now simply lifted on the end of a fork, placed in the chocolate, and rolled about in it until fairly covered with chocolate, and set out upon an oiled plate or wire grating to dry, or they may be put within the screen or "stove" to hasten their drying.

If, however, the cream has been prepared in the third method, it must be poured into the starch moulds, which are prepared precisely as described in Gum Drops. [These moulds are made in starch flour (very dry), the patterns being pushed down into the starch, and then carefully lifted out. We only allude to it here, as the process is fully described in the article mentioned.] Here the creams are allowed to *set*—that is, to dry somewhat—and then taken out of the moulds, dusted, and rolled into the chocolate, as before

mentioned, the preference in this case being for the chocolate prepared in the second method.

27. COFFEE CREAM DROPS.

These are prepared much the same way as the chocolate cream. The same cream is used for the interior of the drop. The outside, or coffee icing, is prepared by beating up the whites of half a dozen eggs, then mixing gradually the icing or powdered sugar until quite thick; now add one half gill of coffee, made as if for drinking, only stronger, so as to give the full flavor of the coffee. It is always better in making coffee for this use, or any other in confectionery, to get fresh-roasted coffee, warm it well, and grind it yourself. It will taste much better than if ready-ground coffee is used.

28. WALNUT CREAM DROPS.

These consist of the combination of walnut—either our native black walnut or the English (Madeira) walnut—and the cream already spoken of. There are two methods of making this combination. One is to make a disc of the "cream" described in No. 26, about as large as a silver quarter dollar, and a quarter of an inch thick, and to stick a half walnut kernel to each side. The other method is to make two thin discs of cream, about the size of the quarter dollar, and to place one-half walnut kernel between them, and to press the edges of the cream together.

Hickory nuts and almonds are also used in this way.

Another variation is to dip the walnut cream, made either way, into coffee icing (No. 27). Coffee agrees with the nut flavors better than chocolate.

29. CREAM PRUNES.

Prunes are prepared by cutting them in half, taking out the pit or stone, and inserting in its place some of the cream, made as in No. 26, then sticking the two halves together.

Dates are prepared in the same way.

30. PINE APPLE CREAM DROPS

Are made by boiling pine apple in syrup until quite tender, allowing it to cool and form a stiff jelly, when it can be cut into equal portions, which are either imbedded in the cream (26) or rolled in an icing, without flavor, or with flavor like the coffee-flavored icing (27).

31. RASPBERRY CHOCOLATES, Etc.

Take raspberry jelly, quite stiff, cut it up, allow the squares to dry a little on the surface, and roll in chocolate prepared as for cream drops.

Any of the jellies can be used in this way, and variations made by using the coffee icing as in No. 27.

32. ALMOND CHOCOLATES.

These are popular in some quarters. They consist of almonds prepared as if for burnt almonds (see 61), and then rolled into the chocolate as chocolate cream drops are. Coffee almonds are the same, rolled in the coffee icing (27).

33. PLAIN ICING.

As we shall have to allude to plain icing very frequently, we may as well say here that it consists only

of the white of eggs, beaten up well in a very little water, and then mixed with powdered sugar (icing sugar) until the thickness of cream. It sets quickly in a very moderate heat or even in the air, and is a good finish for many things.

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34. COCOANUT CREAM DROPS.

These are made simply by mixing dessicated cocoanut with the cream, as in 26, and then rolling in plain icing, which see. The cocoanut should be soaked in milk, and boiled somewhat before mixing with the icing.

35. Cocoanut Cream Drops, No. 2.—These are made by simply making an icing of white of egg and icing sugar, as already described, and then mixing therein dessicated cocoanut. The proportions are equal quantities of sugar and cocoanut; white of egg enough to make the icing. Drop upon tin plates and bake at a moderate heat.

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36. DROPS OR PASTILLES.

Of these there is a limit only in man's power of combination of flavor, color and sugar; but a few retain such a steady popularity, they are made and sold in every locality. There are few things in candy-making so easily prepared. The process is as follows:

Put into a dropper (see Mint Dropper under head of "Tools.")—

2 lbs. sugar, granulated.
½ gill water.

Heat gently, but do not let it boil. When it makes a slight noise, which is a sign of its beginning to boil, stir it, and perhaps move from the fire, if need be, or

put on another ring of the furnace; at any rate, keep down the heat; add such color as may be desired (this is generally quite light and delicate for drops); and then add the flavor, which may be an essence or powder. The sugar, when done, should be of a consistence to drop without spreading. If it should be too thin, add sugar. Now drop the melted sugar on sheets of tin or paper, in successive drops, as near the same size as possible, from the tip of the dropper, wiping off each drop with a piece of wire in the other hand. It is this piece of wire which enables you to keep the drops all the same size. When the drops have cooled, they can be started from the tin by bending to and fro, or from the paper by a thin knife, by bending the paper, or by moistening the back of the paper. If the drops have been made of the proper consistence, they will start easily from the paper. In some places they are sold adhering to the paper. It is a convenient method of dealing them out, and they look well in that way. They should be dried somewhat by putting them within the screen or stove, but the heat should be gentle, or it will drive off the flavor, and they should be kept in air-tight jars. We give the special recipes for each kind below.

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37. PEPPERMINT DROPS.

2 lbs sugar.
½ gill water.

Heat and operate as described. Add five to ten drops strong peppermint essence; more if desired, and drop.

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38. CHOCOLATE DROPS.

2 lbs. sugar.
½ gill water.
2 oz. chocolate

Scrape the chocolate and add gradually to the sugar. Stir well, and drop. All must be dropped, and the dropper cleaned before making another batch. If this is not observed, your second batch will be spoiled.

39. COFFEE DROPS.

Half gill strong coffee made from two ounces of the berry.
2 lbs. sugar.

As above. If too thick to run, add a little water.

40. CINNAMON DROPS.

2 lbs. sugar.
½ gill water.

As before. Before dropping, stir in one ounce of powdered cinnamon, or ten drops essence of cinnamon. There is a rather unpleasant practice among confectioners of coloring these drops with *bole ammoniac* (Armenian bole) a kind of reddish-brown earth. This is done when the essence of cinnamon only is used to flavor, but it is not wholesome, and certainly injures the flavor, though a very small per centage is used. This bole is neither more nor less than red chalk.

41. CLOVE DROPS.

Like Cinnamon.

42. VANILLA DROPS.

Sugar and water, as in previous recipes. Flavor it with powdered vanilla in preference to the essence.

The latter *greases* the sugar, *i.e.*, it makes it heavy and tough on cooling instead of tender and melting, as it should be.

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43. VIOLET DROPS.

Sugar and water, as before. Stir in one ounce powdered orris root before dropping. (These are old-fashioned breath-sweeteners. They are not fashionable now, but some day they may become so. The same is true of Catechu drops.)

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44. CATECHU DROPS.

Sugar and water, as before. Six ounces powdered catechu. Add a drop of musk or ambergris before dropping.

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45. GINGER DROPS.

These are considered stomachic, and are still sold by some druggists. Sugar and water as in the other drops. Before dropping, add one ounce powdered ginger or twenty drops essence, or stronger if desired. Color yellow with saffron.

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46. LEMON DROPS.

Sugar and water, as before. To flavor, add either the yellow part of two or more lemons, rubbed off with rough sugar and mixed with the sugar in the dropper, or essence of lemon. The first process is the best. The two are often united. Color, faint yellow.

47. ROSE DROPS.

Sugar and water, as before. Flavor with rose essence, and color red.

48. ALMOND OR ORGEAT DROPS.

Sugar and water as before. The almond flavor is either the essence or the milk of almonds. The latter is obtained by first blanching the almonds—that is, scalding them and slipping off the skins—then chopping them up and afterwards crushing them in a mortar, with the addition of a little lemon juice, to prevent them from "oiling," and the gradual addition of a pint of water to every pound of almonds. Finally, when thoroughly crushed, the compound is put into a cloth and the milk wrung out. The remainder of the almonds is again beaten and put through the same process until all the almonds are reduced to a milky pulp. Use two or three tablespoonfuls of this milk of almonds to flavor the sugar for drops. This is an old-fashioned method, but the result is very good.

49. FRUIT DROPS.

Press out the juice of any fruit through flannel and use instead of water, and in the same proportions so mix with the sugar. Only make as much as you wish to use at one time, or, in other words, clean out the dropper each time. The old sugar will *grease* the new unless this is done.

If an orange flavor is desired, rub off the rind as is pointed out in lemon drops.

50. CHOCOLATE NONPAREILS.

These are only chocolate drops, made as described

(31), and some sugared caraway seeds (nonpareils) poured upon them while the drops are still moist. The nonpareils stick to the drops, and, being of different colors, make an ornamental crust upon the surface. (See Nonpareils.)

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51. GUM DROPS.

They are made with ease, though the manipulation requires some dexterity and a little experience, which is soon gained. Their manufacture depends upon this peculiarity of gum solutions. If a solution of gum, or gum and sugar, is dropped into any position where it can retain its shape, the outside of the drop will dry and the inside will remain moist for a considerable time, protected from the drying influence of the air by the hard external coating.

If the mixture contains a spirit like brandy or a liquor, the spirit or liquor will gather on the inside of the gum mixture, and will be preserved from evaporation by the film or skin outside.

Hence, to make gum, brandy or liqueur* drops, or bonbons, we have to hold the drop in a definite position by means which will not allow the gum and sugar to stick to the mould or pattern. The means we have in *starch powder.* We will first describe the gum mixture, and then the starch powder mould.

Dissolve in a "dropper" any specified quantity of clean gum arabic in three times its weight of hot water; stir till dissolved; then add best granulated, sugar in quantity equal to the gum and water in weight. Put over the fire and heat in a mint dropper, but not to the boiling point and add the desired flavor. Now for the

* The liqueurs or cordials used by the confectioner are obtainable of wholesale grocers. Should it be desired to make them which can be done easily and at slight expense, the nessary formular and directions can be found in the "Barkeepers Manual," price 50 cents.

STARCH MOULDS.

Have one or more flat boxes, say an inch deep, filled with powdered starch, and perfectly dry. The top surface must be stroked off, even and smooth, with a straight stick. Into this starch powder or flour press any pattern desired, and repeat as often as convenient. A quick method is to have a number of patterns—often these are only buttons—glued or fastened to a long stick, so that a whole row of them can be impressed at once upon the powdered starch. Lift your pattern up perpendicularly so that you will have a clean mould. Your starch patterns are now all ready; in other words, the starch powder being filled with little pits, you take the dropper in one hand and a piece of wire in the other to cut off the fluid as it falls into the little pits, each receiving only enough to fill it. As each box of pits is filled it is set aside in the stove or within the screen to hasten the drying. In twenty-four hours they will be dry enough to take out of the starch. Put them into a sieve and shake gently and otherwise dust them off. They may be allowed to dry a little more when out of the starch, when they should be crystallized (see Crystallization) or glacéd. This gives them a handsome finish; and when taken out they should be kept in air-tight jars. They will retain their interior moisture a long time. All the gum mixture should be used up, for it will not work so well if allowed to dry down.

Some confectioners, instead of crystallizing gum drops, finish them by the imitation crystallizing, which see.

CHEAP GUM DROPS.

Many of the gum drops sold where trade is quick are made thus: 1 lb. of starch is mixed with sufficient cold water to make a stiff paste; then pour over boiling water to make it clear as in fig paste. Add

½ lb. pound glucose and 1 to 1½ lbs. sugar, and stir briskly over a very moderate fire. A mixture is wanted that will pour into the mould. Flavor with any essence desired, and proceed to pour into the starch moulds as before described. While fresh these drops can hardly be distinguished from those made with natural gum (starch when boiled is converted into an artificial gum), but if allowed to grow stale their inferior character is easily detected.

Gum drops can be made with isinglass or any other tasteless animal glue, but they are no cheaper than those made by the aid of starch, and when dry, unless of the best material, their offensive flavor would speedily destroy the trade of the dealer.

When the gums are to be colored, they are generally given a pink or red tint. The ordinary confectioner's color is to be used. If not to be crystallized, it is well to brush off the drops with a camel's hair pencil dipped in alcohol. This brightens them much.

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52. BRANDY AND LIQUEUR DROPS.

These drops require rather more experience and skill than the preceding, but we give them here, as it is a more appropriate position for the recipe than elsewhere.

The patterns are prepared in starch powder, as previously explained. The sugar is boiled to the *ball* as follows:

To each

1 lb. sugar.

Add ½ gill of water.

Boil to the ball, and then add 5 to 20 drops brandy or any other cordial or essence desired, stir quickly, warm once more, and drop into the patterns from a mint dropper and allow to harden. Remove from the starch in twenty-four hours; brush off the powder and put into trays in the stove or within the screen. They

may be crystallized afterward if desired, or lightly moistened, and imitation crystallized.

53. TO FORM A CHAIN OF LIQUEUR RINGS.

Have some moulds to form the impressions in powder, as in the preceding, in the shape of the links of a chain; fill them with syrup at the ball, as before, and put them in the stove for a day; when they are hard and fit to be taken out, place them on their ends in the powder; have another mould of a link in two halves, and with this form the impression between each of the others so as to make it complete; then fill them and finish as before.

54. ROSOLIOS OR KISSES.

By one of these names some confectioners designate a large liqueur drop made in the same way as described in the preceding paragraph. They are boiled, flavored, cast and crystalized in the same way. The distinction between these and ordinary liqueur drops is, that the former are colored. The ordinary colors are used. The quantity used should be quite moderate, so as to give a tint instead of a full color. Blue is considered proper for maraschino, curacoa, etc.; green for anniseed, absinthe, etc.; and red or pink for brandy.

55. COCOANUT PASTE, CREAM, ICE OR CANDY.

These names are all in use, and all mean the same thing. We have even heard the production called cocoanut caramel. The article is made as follows:

7 lbs. granulated sugar
¼ oz. cream of tartar.
3 pts. water.

Boil to the feather (235° Fahrenheit), rubbing it with a stout spoon or pallette knife against the side of the pan until it grains or, becomes creamy. This must be thoroughly done to make a good candy. Then add the grated whites of two cocoanuts, and stir it thoroughly. Mix quickly, and pour out into your shapes—tin pans or dishes, oiled.

A drop or so of lemon essence is relished in cocoanut ice or candy in some localities, but is just as much disliked in others.

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56. RED COCOANUT ICE.

As before, but boil to the *ball* (240° Fahrenheit), and add half a cup full of cochineal to every seven pounds of sugar used.

Where large quantities of this candy are made, a portion of unboiled sugar is added to the boiled, and worked in just before the finish. The candy is then poured upon the slab, and left to cool till morning, when it is cut by a machine. The small candy maker can get a hint from this, after he has had a little practice, so as to shorten his labor.

57. Cocoanut Ice with Yellow Sugar.—Same as before, using yellow or coffee sugar instead. Molasses is even used, and with very profitable results by those who make for street sale only.

Note.—All cocoanut preparations are apt to sour in warm weather.

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58. ROCKS.

By the term "Rocks" are designated a kind of candy much sold on street stands, composed of a basis of pulled candy, made either of molasses or brown sugar, pulled until it is white, then coiled down into a mass and covered with a thin layer of candy, made of

granulated sugar, and colored with carmine or cochineal. This *casing* with a colored candy is done by rolling out the colored candy on the slab with a rolling pin, and then laying it over the white; or oftener still, by just pouring out the colored candy, boiled to the crack, over the other. In such case, you must wait and let the casing sugar cool sufficiently to run very slowly.

LARGE ROCKS, STRAWBERRY, OR RASPBERRY.

All kinds of fancy names are given to these rocks, as Washington Rock, Plymouth Rock, etc., etc. Square or round, are made in the same way as the last, with some of the solid sugar put into the middle of the pulled sugar, doubled over a half a dozen times or more, and afterwards cased. They are flavored with any of the fruit essences, and for all very thick rocks, the sugar must have a little more cream of tartar, and be boiled a little beyond the crack, and when pulled out to the diameter of about six inches, put them between two iron bars; by turning over when half cold they become square, and when cold are chopped in slices.

59. BURNT ALMOND ROCK

7 lbs. sugar.
3 pints water.
¼ cream of tartar.

Boil to the crack. Then add 3 lbs. sweet almonds, blanched and dried sometime previously. The almonds will reduce the sugar below the crack; it must, therefore, be carefully boiled up again. Stir while this is doing with an iron or copper rod, all one way. When it reaches the crack again, pour out. The almonds will be sufficiently done in the sugar.

60. Another Almond Rock.—This is made with brown sugar, which is boiled to the crack. Pour it on an oiled stone and fill it with sweet almonds, either blanched or not; the almonds are mixed with the sugar by working them into it with the hands, in a similar manner as you would mix anything into a piece of dough. If they were stirred into the sugar in the pan it would grain. Form the rock into a ball or roll, and make it into a sheet about two inches thick, by rolling it with a rolling-pin. The top may be divided into diamonds or squares by means of a long knife or piece of iron; when it is nearly cold cut it into long narrow pieces with a strong knife and hammer or the machine.

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61. NOGAT.

This is another form of almond confectionery, in which the sugar is not boiled. The method of making it is as follows: Two pounds of sweet almonds, one pound of sugar. Blanche the almonds and cut them in slices, dry them at the mouth of a cool oven, and if slightly browned the better; powder the sugar and put it into a stewpan, without water; place it on the fire to melt, stirring it with a spatula until it becomes a fine brown; then mix in the almonds, and let them be well covered with the sugar; pour it out on an oiled marble stone. It may be made into a thick or thin sheet, and cut with a knife into small pieces, such as dice, diamonds, etc. The surface may be strewed with currants, fillets of pistachios or coarse sugar, and cut into different forms with tin cutters. It may also be formed into baskets, vases, etc. Oil the interior of a mould, and spread the nogat over it, while warm, as thin and even as possible. To save the fingers from being burnt, it may be spread with a lemon. Detach it from the mould when warm, and let it remain until cold, that it may retain its shape perfectly, then fasten the different parts together with

caramel sugar. For baskets, a handle of spun sugar may be placed over it, or ornamented with it, according to fancy. These may be filled with whipped or other creams when required to be served.

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62. BURNT ALMONDS.

Genuine burnt almonds are done as follows:

Four pounds of sweet almonds, not blanched, are put into the swing pan (see under head of Tools p. 21.) with two pounds of clarified syrup made from granulated sugar. Boil until the almonds crack, move from the fire and stir until the sugar on them becomes granular or sandy. Drain on a seive; put two pounds more of syrup into the pan; add the drainings from the first operation, and do the same thing over again. Finally, drain them and let them dry in the drying room or screen. They should *not* look smooth. Color with cochineal.

63. Burnt Almonds (Second Method) :—

These, as commonly sold, are not burnt, but merely sugared. To make them, put two pounds of sweet almonds into a good-sized pan; boil four pounds brown sugar to the thread, or 235. Having kept the almonds in the pan warm, put a quarter pound of sugar dust among them, then pour about half a pound of the boiled sugar over them, and immediately stir them well about with the spatula. The sugar thus having grained partly over the almonds, and dried, and having parted those that adhere, proceed to do the same with the rest of the sugar, till you get them to size; increase the syrup to about a pound, after the first coating, but avoid putting too much on at a time; sift them in a coarse sieve to take the loose sugar away; to finish, boil about three or four pounds loaf sugar as before, with an egg-cup of cochineal; proceed with that as before directed. When at the last, add

to the remainder of syrup an egg-cup of cochineal or liquid carmine, the same of water, poured over and stirred till well covered; turn them out in a coarse sieve to dry.

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64. SUGARED ALMONDS (Polished).

The handsome sugar plums which we see in confectioners' windows are made in the pan with the aid of gum arabic, and polished by the continued work of the confectioner. Any specified quantity of blanched and well-dried sweet almonds, of the best quality, are put into the swing pan, which is cold. A ladleful of thin solution of gum arabic is poured over them, and they are tossed upward and forward continuously until they dry. They are now put into the drying room and the sugar coating prepared by making a thin syrup with the aid of a little heat; but do not boil (strain it for the best work); put the almonds back into the swing pan; pour over them this syrup, and go through the same process as before, swinging until dry. Give two or more coats in this way. If the almonds are very regular in shape, they will not need so many coats as if they are irregular. If wanted *red*, finish with a mixture composed of equal parts of gum and sugar, and as much carmine as both together in water. Give this last coating in the same way as the others, and repeat two or three times for a fine polish. Finally, put into the drying room to dry thoroughly.

If they are wanted white, make a last coating prepared as follows: Boil granulated sugar, say three pounds, with a pint of water, to the feather, and remove from the fire; then add six ounces powdered starch and stir thoroughly; give it a drop or two of blue color, which will intensify the white. Give the almonds, after the first or gum coating three to five coats of this mixture in the swing pan, each coat finished the same as the others. The result will be very handsome, polished, white, sugared almonds.

These operations are all conducted without fire, except where it is directed to warm the syrup.

The almonds need not be removed from the swing pan with every coat, it is only necessary to see that each coat is dry before a new one is put on. The various coatings are kept by professionals in a "pearling cot," which is a vessel containing a plug in the bottom held by a twisted string. (See Small Comfits.) This string is so arranged that a touch of the finger pulls the plug out a little way, allowing the syrup to run through upon the almonds. Taking the finger off the string allows it to fly back and keep the plug in. Others like to work with a dropper to drop the syrup, and a few like to use a whisk broom, but this is slow and not very tidy. Every kind of variation is made in sugaring almonds, with a view to producing them cheaply.

In the cheaper kinds brown sugar is used instead of white when red ones are wanted, and the almonds are left unbleached, and cheap white sugar for white ones in combination with a greater quantity of starch. Almost any method will answer which will make the sugar, or sugar and starch, adhere to the almond kernel. In many kinds there is just enough sugar to be perceptible, all the remainder of the coating being farina and starch. The polish comes from the constant attrition against the sides of the pan.

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65. CREAM CANDIES.

Cream candies are candies made of worked sugars properly flavored only. There is no other cream about them. The mode of manufacture is as follows:

7 lbs. sugar, granulated.
3 pints water.
¼ oz. cream of tartar.

Boil to the thread; remove from the fire, and allow

to cool somewhat. With spoon or palette knife work the syrup against the side of the pan until it changes into a thick cream-looking substance, called "soft grain" by professionals. When in this condition add any fruit essence—almonds, almond essence or milk of almonds, or preserves desired—mix well, and pour out into pans or oiled moulds. The "creaming" may be done on the slab.

66. LEMON DROPS OR CANDY.

7 lbs. gran. sugar.
3 pints water.
¼ oz. cream of tartar.

Boil to the crack; pour out on the slab, and when somewhat cooled work into the mass ¾ oz. of citric acid, if desired, of fine quality—if of ordinary quality, tartaric acid will do—and a half a teaspoonful of lemon essence. Color slightly with yellow, if thought desirable, before pouring on the slab. Pass through the machine if wanted for drops, or divide into strips and cut with scissors.

67. COUGH CANDY.

7 lbs. gran. sugar.
¼ oz. cream of tartar.
3 pints water.

Color with a spoonful of saffron water. Boil to the crack; pour out on the slab. When stiff add ½ oz. tartaric acid, teaspoonful of aniseed, and two drops of peppermint. Mix thoroughly, and then pull on the hook When done form into strips, rolls or drops.

68 Cough Candy.—Same as the last, substituting brown sugar.

69. HOARHOUND CANDY.

7 lbs. sugar, white or brown.
¼ oz. cream of tartar.
1 quart water.
½ pint of strong hoarhound tea.

Boil to the feather; grain against the sides of the pan with spoon or spatula, slightly, not enough to cream it, say two or three minutes only, then pour out on the slab. Form into flat sticks, rolls or drops.

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70. SUGARED PEANUTS.

Sugared peanuts are introduced every little while in the large cities. When well made they are very popular, and are very profitable. They generally have only a run of a few months, partly because stale stock is offered by the retailers; (few goods are worse than stale peanuts) and partly because less attention is paid to the manufacture, and partly because the taste of the buyers changes. They are prepared in the same way as burnt almond is (No. 62). The peanut kernels should be cleaned of their skins before putting them into the syrup. They should be burnt and sanded in the same way.

SUG. PEANUTS NO. 2.—A cheaper way than the above is to roast the peanuts in the ordinary way, clear them of their shells, buffet them well about in a seive to get off the skins, and then put them into the swing pan over the fire. Here give them first a dash of syrup boiled to the feather, swing a few minutes, and empty into a vessel containing a low grade of white sugar. Shake them about so that some of the sugar will adhere. Shake them in a sieve to clean them of the brown sugar and they are ready. This makes a very good article.

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71. HONEY-COMB CANDY,

SPONGE SUGAR, HONEY-COMB CANDY, ETC., ETC.—This form of candy is known by all the above names, and

probably by some others unknown to the writer. The process is as follows: Having made a wooden frame about twelve or sixteen inches square, and four inches deep, place it on a wet slab or wooden bench; take seven pounds of loaf sugar (no lowering), boil to the caramel degree, previous to which, in a pound jar, three parts filled with icing sugar, mix the whites of two eggs, beat it well till stiff for plain icing; when the sugar comes to the degree required, put in any flavoring or color you like, take it off, pour your icing in, and immediately agitate the whole quickly with the spatula; in two or three minutes it will rise to the edge of the pan, let it fall again, and continue stirring; as soon as it begins to rise the second time, instantly pour it into the frame. Many fail at this process, from pouring out at the first rising, which on the slab becomes perfectly flat and heavy; when cold, remove it by passing a fine string or long palette-knife underneath it.

72. CHIPS.

Opera Chips, Florence Chips, Boston Chips, Centennial Candy (anything for a name) are only sugar, loaf sugar preferably, boiled to the crack, flavored as you like, pulled and striped, or worked plain. It is finally run between a pair of rollers and flattened out very thin; these thin sheets are cracked up into irregular pieces. They have proved very popular within the last year or two.

73. IMITATION PLUM PUDDINGS.

These were a very great novelty when first made; though not so general now, they are still made at Christmas in some places. The following plan will be found to answer. Having got ready picked and

stoned three pounds raisins, two pounds currants, half pound peel cut in strips, and about one pound of almonds blanched and cut into small pieces to look like suet, take seven pounds of brown sugar, boil to the blow (if very strong sugar is used it must be reduced), let it remain off the fire a short time to take some of the heat off, then grain it in the usual way, and immediately put into the sugar your ingredients, work an ounce of mixed spice into it thoroughly with the spatula, put it into wet pudding cloths and tie them tight, exactly the same as a pudding, and hang up till they get firm.

74. BRANDY BALLS.

Brandy balls are made with brown sugar boiled to the crack, and when on the slab work in of good peppermint sufficient to make them strong; some make them black by working in about an ounce of ivory black to seven pounds of sugar; they are cut by rolling to the proper size and cutting off with knife or large scissors, or by ball cutter (see Tools), and rolled round with the hands; if left as they are cut, they are called peppermint cushions.

75. ROCK CANDY.

Boil any given quantity of loaf sugar, granulated or other, to the feather; then pour into any vessel in which threads may run across. Put into a warm place and allow it to remain five or six days. When crystallization has ceased, pour off the remaining syrup and rinse out the inside with cold water, and put back into the drying room or within the screen to further dry. To color it, use a carmine, saffron or blue. The first two are most admired. Special kettles, provided with holes for passing the strings

through, are sold by the makers of confectioners' tools. These holes are covered with paper, pasted on to prevent the syrup from going through. The object of the strings is to hasten the crystallization.

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76. PERSIAN SHERBET.

This is a very favorite sweet in London, and may, perhaps, be introduced with profit here.

Mix fourteen pounds of fine powder sugar with five and a half pounds tartaric acid and five pounds of carbonated soda. Before the soda is added, work into it one ounce of essence of lemon; a little orange essence adds to the fragrance and flavor. There is a cheaper article made, but the above is not to be surpassed.

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77. SMALL COMFITS OR NONPAREILS, ETC.

If we were to classify our goods after the old style, our sugared almonds, our sugared pea-nuts and polished almonds should come under the head of comfits, for comfits are really only seeds or other solids covered with a coating of sugar. But we wished to give first what the buyer of this book would be most likely to want. Under the above head we will therefore give general and special directions for making nonpareils and other small comfits.

A swing pan is requisite for this purpose, as in sugaring almonds. A batch-pan, containing clarified syrup, must be placed by the side of the stove, or over another fire, that it may be kept hot, but not boiling; also a ladle for throwing the syrup into the pan, and a pearling cot. This last somewhat resembles a funnel, without the pipe or tube, and having a small hole in the centre with a pointed piece of stick or spigot fitted into it, which, being drawn out a

little, allows the syrup when placed in it to run out in a small stream. A piece of string tied several times across the centre of the top of the cot, and twisted with the spigot, allows it to be drawn out and regulated at pleasure.

78. SCOTCH CARAWAY COMFITS.

Sift two pounds of caraway seeds in a hair sieve to free them from dust, put them into the comfit pan, and rub them well about the bottom with your hand until they are quite warm; have some clarified loaf sugar in syrup and boiled to the thread; give them a charge by pouring over them about two tablespoonfuls to commence with; rub and shake them well about the pan, that they may take the sugar equally, until they are quite dry. Be careful in not making them too wet in the first charges by using too much syrup, or they will lie of a lump and get doubled, and you will have difficulty in parting them. It will prevent their sticking together if the hand is passed through them between every swing of the pan, and also add to their smoothness. Do not let the heat under the pan be too strong, or it will spoil their whiteness. Give them four or five charges, increasing the quantity of syrup a little each time, and let each charge be well dried before another is given, dusting them at the last charge with flour. Sift them in a hair sieve and clean the pan. Put them in again, and give them four or five charges more, with a dust of flour at the last; then sift them and clean the pan. Proceed in this manner until they are one-third of the required size. Put them into the stove or sun to dry until the next day, then clarify and boil some sugar to the large thread, keep it warm as before, divide the comfits, and put part of them in the pan, so as not to have too many in at one time; for as they increase in size you must divide them into convenient portions, so that you may be en-

abled to work them properly without encumbering the pan. Give them four or five charges of syrup, proceeding in the same manner as before, until they are two-thirds or more of the required size, and stove them until the next day. Continue in this manner with each portion alternately, until they are all done. On the third day boil the syrup to the small pearl, and give eight or ten charges as before, without using flour, so as to finish them, lessening the quantity of syrup each time. Swing the pan gently and dry each charge well. Put them in the stove for half an hour or an hour after each charge, and proceed alternately with each portion until they are finished, when they should be about the size of peas. Put them in the stove for a day, then smooth them with the whitest loaf sugar in syrup, boiled to the small thread; add two or three tablespoonfuls of dissolved gum arabic with it to give them a gloss. Give them three or four charges with a very gentle heat, the syrup being cold and the pan scarcely warm. Work and dry each charge well before another is added; when finished, dry them in a moderate heat. It is the best way, if possible, to dry comfits in the sun, as it bleaches them. If the stove is at a greater heat than the sun in a moderately warm day, which is from 70 to 80 degrees of Fahrenheit, it will spoil their whiteness.

79. BATH CARAWAYS.

They are made in the same way, but only half the size.

80. GINGERBREAD CARAWAYS.

Sift the seeds and warm them in the pan, as for Scotch caraways. Have some gum-arabic dissolved, throw in a ladleful, and rub them well about the pan with the hand until dry, dusting them with flour. Give

them three or four coatings in this manner, and then a charge of sugar, until they are about one-half the required size. Dry them for a day, give them two or three coatings of gum and flour, finish them by giving three or four charges of sugar, and dry them. These are made about the size of Bath caraways. Color parts of them different colors, leaving the greatest portion white.

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81. CINNAMON COMFITS.

Cinnamon is the bark of a tree, of which there are two sorts. The inferior quality is that usually sold for cinnamon, and is otherwise known as cassia, or *cassia lignea.* This breaks short, and has a slimy mucilaginous taste, is thicker, and of a darker color than the cinnamon, which is the inner bark. This breaks slivery, and has a warm aromatic taste, and is of a reddish color.

Take one pound of cinnamon bark, and steep it in water for a few hours to soften it; cut it into small pieces about half an inch long, and the size of a large needle. Dry it in the stove. Put your pieces, when dry, into the comfit-pan, and pour on them a little syrup, as for Scotch caraways, proceeding in the same way until they are one-third the required size. You must not use your hand for these as you would for caraways, as they are liable to break in two. Dry them in the stove, then suspend the pearling pot or cot from the bar of the pan or ceiling, so as to hang over the centre of the pan; boil some clarified loaf sugar to the smooth (2150), and fill the cot; put some of the prepared comfits in the pan, but not too many at a time, as it is difficult to get them to pearl alike. Keep the syrup at the boiling point; open the spigot of the cot so as to allow it to run in a very small stream, or more like a continued dropping; swing the pan backwards and forwards gently, and keep a stronger fire

under the pan than otherwise. Be careful that the syrup does not run too fast, and wet them too much, but so that it dries as soon as dropped, which causes them to appear rough. If one cot full of sugar is not enough, put in more until they are the required size. When one lot is finished put them in sieves to dry, and proceed with another; but do not let them lie in the pan after you have finished shaking them. They will be whiter and better if partly pearled one day and finished the next. Use the best clarified sugar to finish them.

82. CORIANDER COMFITS.

Proceed with these as for Scotch caraways, working them up to about the same size. The next day pearl them to a good size, as for cinnamon.

83. CELERY COMFITS.

Put one pound of celery seed into the pan, and proceed as for Scotch caraway comfits, working them up to the size of a large pin's head. Dry and pearl them as cinnamon.

84. CARAWAY COMFITS, PEARLED.

When the comfits are about the size of Bath caraways, dry and pearl them as cinnamon.

85. CARDAMON COMFITS.

The seeds should be kept in their husks until they are required to be used, as they lose much of their flavor and virtues when deprived of them. They are

often mixed with grains of paradise, but these have not the aromatic taste of the cardamon, and are more hot and spicy. Break the husks of the cardamons by rolling them with a pin; separate the skins from the seeds, put two pounds into the comfit-pan, and proceed as for Scotch caraways. Make them a good size and quite smooth.

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86. BARBERRY COMFITS.

Pick the barberries from the stalks, and dry them in a hot stove on sieves; when dry, put about two pounds into the comfit pan, and proceed as for almond comfits, giving them first a charge of gum and flour, and finish as others. Make them of a good size and quite smooth; finish with very white loaf sugar in syrup.

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87. CHERRY COMFITS.

These are made from preserved cherries, dried. Roll them in your hand to make them quite round, dust them with powdered loaf sugar, and dry them again; then proceed as for barberry comfits. Any other preserved fruits may be made into comfits after the same manner.

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88. COMFITS FLAVORED WITH LIQUEURS.

Blanch some bitter almonds, or the kernels of apricots or peaches; let them soak in hot water for an hour, then drain them, and put them into any sort of liqueur or spirit you may desire. Lower the strength of the spirit with water, that the kernels may imbibe it the better, cork the jug or bottle close, and let them infuse in it until the spirit has fully penetrated them, which will be about fourteen or fifteen days; then

take them out, drain and dry them in a moderate heat; when dry, proceed as for almond comfits.

89. ORANGE COMFITS.

Take some preserved orange-peel, and cut it into small thin strips; dry them in the stove, and make as cinnamon comfits.

LEMON PEEL OR ANGLICA may be made into comfits after the same manner. Let the strips of peel be about the size of the pieces of cinnamon, and thoroughly dried before working them in the pan.

90. NONPAREILS.

Use caraway seed, and proceed as for Scotch caraways, working them well with the hand until they are about the size of pins' heads.

TO COLOR NONPAREILS OR COMFITS.—Put some of your comfits or nonpareils into the comfit-pan, shake or rub them about until warm, then add a sufficient quantity of prepared liquid color (see Colors) to give the desired tint; be careful not to make them too wet, nor of too dark a color, but rather light than otherwise; shake or rub them well about, that they may be colored equally; dry them a little over the fire, then put them in sieves, and finish drying them in the stove. Clean the pan for every separate color.

91. CANDIED CALAMUS OR SWEET FLAG.

The root is dried, cleaned, cut into pieces about ¾ of an inch long and treated with syrup as in 81. Some split and press the root before candying so as to make

a handsome looking article. By many also the root is boiled somewhat previous to candying to extract some of the bitterness.

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92. LOVAGE.

Lovage is treated in all respects like Calamus.

LOZENGES.

These can be made in small establishments, but the large ones, where machinery is employed, make them so much cheaper that in most places it will not pay to compete with them. The process is simple. Any quantity of good clean gum arabic is dissolved in twice its weight of hot water—that is to say, a pound of gum to a quart of water. When thoroughly dissolved, sufficient powdered sugar, sifted through coarse muslin, is added to the gum and thoroughly mixed with it, and the flavor is added at the same time, until it becomes of the consistency of pie dough. It is then rolled out upon a board to a regular thickness, still after the manner of dough, and with an ordinary wooden pastry roller. It is now ready for the cutter, which can be had of dealers in confectioners' tools. These cutters are made without a lap joint, are slightly smaller at the cutting end than at the other, and may be of tin or steel. Tin will do ordinarily, for the lozenge dough cuts easily. As the lozenges are cut they succeed each other in the cutter until that implement is full. The workman turns it and knocks out the lozenges upon a tray of tin or other material, and they are placed within the drying room or screen to dry, while he proceeds to cut more. To prevent any sticking, use powdered starch freely upon the rolling board or slab, and keep pow-

dered starch upon the hands; indeed, many manufacturers in the large way use starch not only to facilitate the work, but also to compose a large part of the lozenge. Many of the lozenges sold in trains are little more than sweetened and flavored starch. It would be well if this were the only adulteration, but conscienceless manufacturers add china clay, called *terra alba*, or white earth, plaster of paris, etc. (The presence of either of these adulterations in lozenges or candy may be detected by dissolving one or two of the lozenges or a piece of the candy in a tumbler of hot water. When the suspected article has been well dissolved, the adulteration will fall to the bottom of the tumbler, where it can be plainly seen.) In factories, the cutting of the lozenges is done by a machine, as well as the rolling out of the dough. This insures uniform size, and a great economy of labor. We give the most approved recipes for the ingredients of lozenges, as there may be localities to which this book will penetrate where it will pay still to make lozenges by hand. In some places it is the custom to use gum tragacanth instead of gum arabic. The tragacanth makes a softer, more melting lozenge when new, and the gum is cheaper. It takes up less sugar and water than the gum arabic. As the confectioners say, it is not so "strong a gum," and it is less easily handled than gum arabic. Nevertheless the Scotch confectioners prefer it for many kinds of lozenges still, and some French work is also done with it.

93. Peppermint Lozenges.—

1 lb. gum.
1 qt. water, hot.
Powdered sugar sufficient to make stiff dough (it will take about 28 lbs).
2 oz. essence peppermint.

94. Ginger Lozenges.—Gum water and sugar as before. Add one pound fine powdered ginger and half ounce essence of lemon.

95. COUGH LOZENGES.—Gum water and sugar as in 49. Dissolve liquorice in water to the consistency of thin molasses, and add to the lozenge dough, and work it well, to color uniformly before rolling out; also work in at the same time

2 oz. ipecachuanha.
1 dram acetate of morphia (morphine.)
1 oz. oil anniseed.
1 oz. powdered tartaric acid.

Mix thoroughly, roll out and cut.

96. COLTSFOOT ROCK.—

1¼ lbs. gum tragacanth.
2 qts. hot water.

Soak well. Strain through a coarse cloth a day beforehand. When all is ready, add thick liquorice to color, and half an ounce essence of lemon. Then work in the sugar. Work well, to get an even texture, after which proceed as usual.

97. ANISEED.—Gum water and sugar as before, liquorice water to color dark brown, and one ounce oil of aniseed.

98. BATH.—Same as the last, omitting the aniseed, and increasing the liquorice to give more color.

Wintergreen, Cinnamon and Cloves are popular flavors in lozenges. They are all made like peppermint except that in cinnamon the powdered bark is used instead of essence.

PRESERVING.

Though not often the confectioner's business in this country to preserve fruits, it may occasionally yet be useful. We give, therefore, some general hints:

WET FRUITS.—Most of the fruits are first prepared by being blanched, that is, boiled in water; they are

then drained and put into boiling syrup, where they remain for a day. The syrup being now weakened with the juice of the fruit, it is poured off, more sugar is added, and it is reduced again to syrup by boiling, and poured hot over the fruit; this is continued until it is fully saturated with sugar, which may be known by the syrup being no longer weakened with the juice of the fruit. Keep them in a dry but not warm place, as too much heat will cause them to ferment, more especially if they are not incorporated with sugar; nor in a damp place, or they will become mouldy.

All green fruits require to be greened, so as to bring them to their original color, for in blanching they assume a yellowish cast; this is probably occasioned by a portion of the alkali being extracted in the boiling. The green color of fruits and leaves depends upon an excess of alkali; and in proportion as acid or alkali prevails in them, so are they colored from red to violet, blue, and green; therefore, if alkali is added to the water the color is retained. This is exemplified in the everyday domestic duties of the cook, who uses soda, potash, or muriate of soda (common salt), in boiling her greens or cabbages. I have here stated the principle on which their color depends, to show that there is no necessity for green fruits being kept for some time in brass or copper pans, whereby they take up a portion of verdigris, which often proves injurious.

Prick your fruit several times with a fork or large needle to allow the sugar to penetrate the more freely As you do them throw them into a pan of cold water, which prevents their turning black at the places where they are pricked; add a little soda or potash, and set the pan by the side of the stove to heat gradually, but not to boil, or at the most only to simmer; when the fruit swims, take it out with a skimmer and put it into cold water; if they are not green enough, drain them and put them again into the water they were first boiled in, or else into a weak syrup; place them

by the side of the stove to heat gradually as before, stirring them occasionally. They may be covered with vine leaves, or a handful of spinach; if salt is used in greening them, they will require to be soaked for a few hours in clean cold water, to again extract that portion which they have absorbed, or it will spoil their flavor. It is best to blanch fruits which are very juicy in hard or pump water, or with the addition of a little alum to river water.

After this put them into a syrup containing a pound of sugar for each pound of fruit. Boil up once; skim; boil up again, and skim. Repeat this three times for soft fruits, more for the hard ones. Take the fruit out of the syrup, drain and put into the jars; then boil up the remaining syrup, skim carefully, and with it fill the jars containing the fruit; seal down the top with pasted paper, putting over the fruit and in immediate contact with it a piece of paper soaked in brandy.

Candied Crystalized Fruits.—Any fruit or peel which has been first preserved in syrup may be candied.

Take the fruit out of the syrup, and let it drain on a sieve; then dip the sieve with the fruit into lukewarm water, to wash off the syrup from the surface; take it out, let it drain, and dry it in the stove. Boil some fresh syrup to the blow; put in the fruit, and give it a boil in it. The fruit when it is put in will reduce the sugar, it must therefore be boiled to the same degree again. With a spoon or spatula rub the sugar against the side of the pan, to grain it; when it begins to whiten put the fruit in the white part separately; with two forks take it out and lay it on sieves or wire frames, for the sugar to drain from it.

Dried Fruits.—Any of those fruits which are preserved with syrup may be dried; they are also better when fresh dried. Warm the fruit in the syrup; take it out, and drain; spread it on sieves or wires; put them in the stove to dry, turning them frequently

until perfectly dried. When the fruit is drained from the syrup, it may be dusted with loaf sugar when you put it in the stove, and for two or three times when you turn it. Too much heat will blacken the fruit, therefore let the heat of the stove be about 100 or 110 degrees of Fahrenheit's thermometer.

Another method still is to give a less elaborate preparation to the fruit previous to drying: scalding, boiling up once or twice in a thin syrup, and then putting in the drying-room to dry off. It is finally covered with hot syrup, boiled to the feather, and allowed to crystalize.

Recent experiment has shown that the Alden method of curing or drying sugar-boiled fruits has been quite successful. The French crystalized fruits are selling here at retail for a dollar per pound, and it may be quite worthy of experiment as to whether the Alden process will not supplant them profitably at half the price.

Candied Fruits for Street Sale.—Oranges deprived of skin and pith, and divided into quarters; apples peeled and cored, and occasionally other fruits, are stuck upon splinters, and dipped into syrup boiled to the crack. They are then laid out to dry, and selling generally at a penny per quarter, they afford large per centage to the Italian street confectioner who tries his hand upon this form of confection. Generally the sugar is colored with carmine.

TO RESTORE STALE ACID CANDY TO ITS ORIGINAL UNFLAVORED CONDITION.

It sometimes happens to the candy-maker that some of his goods remain on hand so long as not to be first rate. It is good policy in such a case to work them over again, instead of giving his customers inferior goods. Old candy can always be brought back to clear

syrup by dissolving it in water (hot hastens it) and running it through a jelly bag. If not clear the first time, run it through again and again until it is, or put some bone-black in the bottom of the jelly bag, and run the syrup through that; or clarify, as explained in *Clarification.* If the color in the candy is no harm, all this trouble need not be taken simple solution in a small quantity of water and reboiling being all that is needed. But if your candy is acid—old lemon drops, for instance—you get rid of the acid by dissolving the sugar in water and then adding powdered chalk enough to make the mixture effervesce. Then run it through the bag as before described. The chalk takes up the acid, and the syrup is as good for any purpose as ever.

SPINNING SUGAR, PIPING, GUM PASTE, ORNAMENTS, ETC.

The making of the numerous artistic designs in the above is the most difficult and the most interesting of the confectioner's art, and as practised in first-rate houses and families of distinction, and especially in France, the workman must not only understand the rules and principles of art as regards perspective, etc., but must be an adept at drawing, modelling, and decoration. The amateur may however practice it for his improvement, and the great satisfaction arising from this pleasing method of employing spare time; and time and patience are very necessary to insure success in these processes, together with skill in manipulation, conception, and design. Gum paste ornaments are used largely for wedding cakes, etc., combined with the liberal application of piping, and we have known many instances in which these alone have fulfilled all the purposes of other and more expensive ornamentation. Great practice is requisite to make a good hand at piping, but we do not see why

any moderately ingenious person may not try the process and succeed. The same remarks apply to spinning sugar. Determination and perseverance will accomplish any of the operations here named.

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99. TO SPIN CARAMEL SUGAR.

Take any small or moderate quantity of clarified loaf sugar and boil to the caramel, take it off quickly and put the pan into a tub of cold water to stop the principal heat, then place it near the stove to keep the sugar warm enough to work with facility.

The moulds you intend to work upon should be copper, tin, or glass, etc., made on the bevel, so as to deliver well. They must be rubbed slightly with fresh butter. The sugar previously spoken of having cooled a little, take a fork and try it by dipping it into the sugar, and hold it up rather high and spin by a shake of the hand ; if it forms threads it will do for the purpose of spinning. Take your mould in the left hand, turn it upside down, take out a little sugar with the bowl of a spoon and pour it out, equally in threads or lines certain distances. When this is finished one way turn the mould round, so as to form an angle, and proceed again crossways in the same manner. The threads ought to be the thickness of twine. When the body of the shape is formed it can be ornamented with the fine silken threads made by spinning the sugar from forks or pronged tools. They can be also made into baskets, by drawing a handle on a smooth greasy slab, and then following the lines with the sugar from the spoon. Spun sugar can also be made into vases, ships, etc., by making the parts separate and afterwards sticking them together with some of the sugar used in the process.

100. GUM PASTE ORNAMENTS.

Blocks, cutters, and moulds are required for this process. Gum tragacanth is the main and necessary ingredient. It is difficult to dissolve and strain, and to do it properly it requires two persons to wring the cloth through which it passes, but it may be forced through a sieve. The gum must be well washed and covered with water a day and night, then strain it as directed; work it well in a marble mortar, with equal quantities of the finest powder sugar and starch powder. It must be very tough by working it thoroughly and bear pulling till it breaks.

Keep the paste in an earthen pot, with a damp cloth always on it. The above is made better with all sugar, or commoner, with more starch powder, and has been very much adulterated by using plaster of Paris. To take the impression from the moulds, use fine starch powder shook over it, as also in rolling the paste to the required thickness and size. Press the paste in the moulds or blocks with your thumb or the ball of your hand, and cut off the superfluous paste with a very thin knife sold for the purpose. You must then knock it out, or make a small lump of paste adhere to the impression and pull it out.

101. SUGAR PIPING FOR CAKES, Etc.

A very fine sugar icing is prepared as directed in the book with the finest powdered loaf sugar and whites of eggs and lemon juice. The tubes through which this is forced are made for many designs in tin by the "confectioners' tool maker," but they can be made with good stiff writing-paper. They are made similar to a cone, with the tip off. It is partly filled with the icing, the top edges turned in, the same as those which a grocer makes by turning around his hand, then press out with the thumb and forefinger

through the opening at the end over your previously iced cake in any form, design, or shape you like, according to the manner you cut the fine end of the paper cone so the icing comes out. Various shapes can be made by varying the cutting, which is done with fine sharp scissors. Many persons may be surprised with the effects of this simple method of piping or ornamenting, and which they can easily try, and with a little ingenuity succeed in, so as to answer all the purposes of a family fruit cake, or even produce sufficiently well formed designs on a wedding cake.

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102. CHEWING GUM.

1 lb. parafine refined.
½ white sugar.
Color to suit.

Melt and pour out into a candy pan and divide when cool into squares.

103. 1 lb. spruce gum (or Venice Turpentine).
½ lb. parafine.

Melt together.

104. 1 lb. spruce gum (or Ven. Turp.)
½ lb. bees wax, white.
¼ lb. tallow.

Melt together.

105. ¼ lb. rosin.
¼ lb. wax.
¼ Ven. Turp.

Melt together.

ICE CREAM AND ICES.

The sale of Ice Cream is frequently carried on in conjunction with the sale of Candy, especially in small

towns. It affords a fair profit, and a taste for the article can often be developed in a community so as to make a steady and lucrative trade where perhaps it had been before unknown. To ensure this result the article must be good The use of both Ice Cream and Ices appears to be extending each year. We give below a number of recipes for different varieties of Creams and Ices which are in use in the trade. The quantities can of course be increased to any extent that may be desired, so long as the relative proportions of the different ingredients are observed.

106. Ice Cream.—

1 pint milk.
2 yolks of eggs.
6 oz. sugar.
1 tablespoonful corn starch.

Scald, but do not boil. Then put the whites of the two eggs into a pint of cream; whip it. Mix the milk and cream, flavor, and freeze. One teaspoonful of vanilla or lemon is generally sufficient.

107.—2 quarts cream.
1 pound of sugar.
Beat up, flavor, and freeze.

108.—1 qt. of milk.
1 sheet of isinglass.
6 oz. of sugar.
1 pint of whipped cream and white of 2 eggs beaten up.
Flavor, and freeze.

109.—Wentworth's Ice Cream.—For 40 qts., use

20 qts. pure cream.
6 lbs. best pulverized sugar.
1 gill extract of vanilla.

Stir together; turn into a 40 gallon can, packed in ice and salt, and beat until it fills the can. Then freeze. It takes from twenty minutes to one hour.

In most freezers there is a beater that whips the cream up while it is freezing.

110.—3 pts. cream.
3 pts. milk.
1 cup sugar.
1 egg.

Beat up the egg first; mix and beat it up again in the milk and cream. Flavor, and then freeze.

111.—1 gall. unskimmed or new milk.
4 eggs.
1½ lbs. sugar.

Beat up the eggs by themselves first; then add to the milk and beat again. Add the sugar, flavor, and freeze.

112. STRAWBERRY OR RASPBERRY.—In mixing your materials for these, mix pure sugar with the juice of the fruit you intend to use first, or you may somewhat curdle your cream. Any of the above recipes will do, allowing a half pint of fruit juice to every quart of the cream or cream and milk. No other flavors.

113. CHOCOLATE OR COFFEE.—For coffee, make a strong extract, a little stronger than for drinking, and use half a pint of it for every quart of cream or milk. No other flavor. For chocolate, scrape 4 oz. Maillard's or Baker's chocolate into half a pint of milk and work it smooth with a spoon. Add to every quart of cream mixture. No other flavor is required. If unflavored chocolate is used, it is best to add the usual vanilla essence.

114. ORANGE ICE (Water Ice).—Grate off the yellow part of the rind of six oranges into a pint of water for fifteen minutes and then strain the liquor. Then squeeze the oranges, and enough more to make a quart of juice. Pour the two together, add a pound of sugar, and mix and half freeze. Then add the

whites of four eggs, beat up in the half frozen ice, and then finish the freezing.

115. Lemon Ice.—Take the juice of a dozen lemons and a quart of water and two lbs. of sugar. Mix, and half freeze. Grate off the yellow part of the rind of three lemons. Let it stand in water fifteen minutes. Strain off; add to the mixture with a teaspoonful of lemon essence and freeze.

116. Roman Punch.—Add to every quart of orange or lemon ice, one-quarter gill of brandy, one-quarter gill of rum.

SODA WATER SYRUPS.

The sale of Soda Water, like that of Ice Cream, is frequently carried on in conjunction with the candy business. The aërated water is served by wagons to customers in the large cities in large cylinders which are attached to the fountain. This aërated water is formed by forcing carbonic acid gas into common water in the cylinder, which is worked to and fro during the operation, to cause the gas to combine with the water. In places distant from the soda water factories the dealer may be obliged to make his own gas and prepare the carbonic acid water (soda water, so called). This is done by pouring sulphuric acid upon marble dust. The marble dust and the acid are sold by the manufacturers of soda fountains, together with machines for the preparation of the water. Ordinarily it can be made for about half what is charged by the manufacturer of the aërated water, but dealers generally prefer not to take the trouble when they can buy the prepared water conveniently. The machines, together with the fountain for displaying the soda water can be had of any one of the firms who make a specialty of these class of goods. The cost varies from

a few dollars to many hundreds, some fountains being elaborate works of art in costly marble with silver trimmings and enormous capacity.

The manufacturers give in their catalogues descriptions of the various articles, with prices, and information as to making the gas. There is no ground for any prejudice against the use of marble and acid for making the gas as neither article enters into the soda water, the gas being a new product entirely different from the two articles from which it is developed.

Whatever course is adopted as to the purchase or preparation of the soda water, it will generally be found advantageous to make the flavoring syrups used in dispensing it. A saving of nearly 50 per cent. is effected, with but slight labor, and freshness and purity are ensured. The following are standard formulas for making the favorite syrups:

117. Sarsaparilla Syrup.—Take of white sugar-house syrup, one gallon; water, one pint; holding in solution one-eighth ounce each of extract of liquorice, gum arabic, and sulphate of iron. A portion of the syrup to be rubbed up with a quarter of an ounce of wintergreen and sassafras.

118. Sarsaparilla Syrup (Parrish's).—Take of simple syrup four pints; compound syrup of sarsaparilla, four fluid ounces; caramel, one and a half fluid ounces; oil of wintergreen and sassafras, of each, six drops.

119. Lemon Syrup.—Dissolve one ounce of citric acid in four of water, and add nine pints of simple syrup; also add four fluid ounces of mucilage acaciæ and a half fluid ounce of essence of lemon.

120. Another Formula.—Grate off the yellow rind of lemons, and beat it up with a sufficient quantity of granulated sugar. Express the lemon-juice, add to each pint of juice one pint of water, and three and a half pounds of granulated sugar, including that rubbed

up with the rind; warm until the sugar is dissolved, and strain.

121. Another Formula.—Dissolve six drachms of tartaric acid and one ounce of gum arabic, in pieces, in one gallon of simple syrup; then flavor with one and a half fluid drachm of best oil of lemon. Or flavor with the saturated tincture of the peel in cologne spirits.

122. Orange Syrup.—To be prepared from the fruit in the same manner as 121.

123. Another Formula.—Dissolve six drachms of citric acid in one gallon of simple syrup, and add two fluid drachms of fresh oil of orange in two ounces of alcohol; or, instead of alcohol solution of the oil, use the saturated tincture obtained by maccerating the peel for ten days in sufficient cologne spirits to cover.

The lemon and orange syrups, made from the fruit, after being strained, may be diluted with an equal bulk of simple syrup. One dozen of the fruit is sufficient to make a gallon of finished syrup.

124. Ginger Syrup.—Mix two fluid ounces of tincture of ginger with four pints of simple syrup.

125. Vanilla Syrup.—Mix two fluid ounces of fluid extract of vanilla with four pints of simple syrup.

126. Syrup of Coffee.—Pure coffee, roasted and ground, half a pound, is infused in boiling water, half a gallon; enough is filtered off to make half a gallon of infusion, in which dissolve seven pounds of granulated sugar.

The best utensil for making the coffee infusion is the French style of coffee pot, having a receptacle above for the ground coffee upon which boiling water is poured, extracting the flavor without the bitter. This infusion drains through a seive bottom into the lower half of the coffee pot. With care, however, a

fair infusion of coffee may be made in any utensil, but continued boiling develops the bitter.

127. Strawberry and Raspberry Syrups.—Mash the fresh fruit, express the juice, and to each quart add three and a half pounds of granulated sugar. The juice, heated to 180° Fahrenheit, and strained or filtered previous to dissolving the sugar, will keep for an indefinite time.

The juice of soft fruits is best when allowed to drop therefrom by its own weight, lightly mash the fruit and then suspend in a cloth, allowing the juice to drop in a vessel beneath.

128. Pineapple Syrup.—Same as above.

129. Nectar Syrup.—Mix three parts of vanilla syrup with one each of pineapple and lemon syrup.

130. Sherbet Syrup.—Mix equal parts of orange, pineapple and vanilla syrup.

131. Grape Syrup.—Mix half a pint of brandy, quarter of an ounce of spirits of lemon, and sufficient tincture of red Saunders with one gallon of simple syrup.

132. Wild Cherry Syrup.—Mash the cherries with the stones and then proceed as in 127.—Some add one ounce of best brandy to every quart of syrup.

133. Cream Syrup.—Take of Borden's condensed milk, one pint; water, one pint; sugar, one and a half pounds. Heat to boiling, and strain. This will keep for over a week in a cool place.

As generally dispensed, the "cream" is used in conjunction with some special flavor, as, "vanilla cream," "chocolate cream," etc. The flavoring syrup being sweet, the above "cream" may be too sweet used therewith, hence the quantity of sugar used in its preparation should be reduced to whatever degree will make it palatable.

134.—Orgeat Syrup.—Cream syrup and vanilla syrup, each one pint; oil of bitter almonds, four minims.

135. Maple Syrup.—Dissolve three and a half pounds of maple sugar in one quart of water. (Most of the syrups not made from fruits may have a little gum arabic or isinglass previously dissolved added, in order to produce a rich froth).

136. Chocolate Syrup.— Bakers' chocolate, four ounces, dissolve in twenty ounces of boiling water, and dissolve in this one pound avoirdupois, of granulated sugar.

137. Walnut Cream.—This is a new flavor. To make it, take one pound of the hickory nuts or walnuts; remove the skin, which if left would give an unpleasant bitter taste. Pound the kernels in a mortar adding from time to time a drop of lemon juice, not to flavor but to prevent the nuts becoming oily. As fast as the nuts are reduced, put them in a linen cloth which should be gathered around them so that they may be squeezed through the cloth. Whatever is left in the cloth is to be returned to the mortar and pulverized further. All should eventually be used up. The result of this process is to be added to two quarts of the "cream" (see 133) and used in lieu of syrup in dispensing the soda.

BREAD, CAKE, AND CRACKER BAKING.

I.—YEAST.

On the quality of the yeast depends the perfection of the bread. With good yeast bread can be made satisfactorily of very ordinary flour, while *poor* yeast will spoil the best flour ever made. There are many methods of using yeast, but the most certain and prompt in the production of good bread and a fine clear crust, is the one in which it is used with a ferment.

To Make Stock Yeast.—Take two ounces of the best hops, and boil in four quarts of water for thirty minutes; strain, and cool to 90° Fahrenheit; then add to it a handful of salt, half a pound of sugar, and a pound of flour, mixed with enough tepid water to form a thin batter, and strain it; mix well, and add a pint of previously made yeast. The so-called German Yeast, National Dry Yeast, or Fleischmann's, will serve for this purpose; it is readily obtained in most parts of this country at grocery stores. Again mix, cover close, and let it remain undisturbed, at about 90°, for twelve hours; then set it away in a cool spot for use as needed.

It now consists of a number of fungi called yeast plant, floating in the liquor. The more fungi contained in a given quantity, the better the yeast is. These yeast plants are easily destroyed by mechan-

ical injury, by heat or cold, or chemical agency. Care, therefore, must be taken that, in setting off the ferment, or sponging, it is not *scalded*, nor exposed before using to excessive *cold;* if it freezes, it is spoiled, and must certainly not be used.

The implements used for the production of yeast should be kept scrupulously free from grease and dirt. Grease delays, though it does not prevent, fermentation. It is best to have the mash-tub, hair-sieve and pail employed in this part of the business used only for this purpose.

Many bakers use malt instead of sugar. In that case, a half-pound of malt will replace the pound of sugar given in the above recipe. The above is now the *Stock Yeast*, a portion of which is preserved, according to your needs, for your next two days' baking, if in summer, and for a week, if in winter, as well as a pint or more for your next reproduction of stock yeast. Always before using smell your yeast; if sour, throw it away.

Another method of making yeast is to add to the recipe already given a teaspoonful of ground ginger. This increases its keeping quality in summer, but adds a little flavor to the bread, if the batch be small.

THE FERMENT.—Pare, wash and remove the defects from a quart of potatoes; boil, and mash them in the tub with two pounds of flour; add to the mixture, gradually, a ten-quart pail of water, of a temperature to reduce the whole to 120°, and two quarts of yeast, as above; cover the tub, and leave it undisturbed six hours.

The object of the ferment is to have the yeast produce its effect by the use of as little as possible of the yeast. If the ferment were not used, so much yeast would be required to do the work in time, that the bread would partake of the bitter flavor of the hops. Even as it is, in most bread the flavor of the yeast can be detected

The Sponge.—In setting off the sponge, the heat or cold of the weather must be taken into consideration in calculating the time for the sponge to "*come;*" that is, to be ready to use. The hotter the sponge is set off, the quicker it comes, and *vice versa;* so that if, by reason of running short in stock of bread, a batch is needed in a hurry, the ferment is dispensed with, the sponge is set off quite hot, but never scalding, and enough sponge made to wet up the dough with, as in French bread (*which see*). With this exception, the way of setting the sponge, then, is as follows: Add to one pail of ferment, as described, two pails of water, of ordinary temperature in summer, and blood-warm in winter; mix, and strain into the prepared bay in the trough; mix into a fair dough, not too stiff; replace the cover; and, when ready, use it. This is sufficient for about 140 pounds of good flour, or five-sevenths of a barrel.

II.—MIXTURE OF FLOURS.

It is customary to buy of the dealer barrels of what is known to bakers as a trade mixture. It answers very well for a novice in the business, but, gradually, as experience is acquired in buying, it is far better to "*make*" the mixture to suit the needs of the class of customers you serve.

In making the mixture, it must be carefully calculated. We will suppose you can afford to spend eight dollars per barrel, each barrel producing an average, through a batch of mixed sizes and shapes, of from a hundred and fifty to a hundred and fifty-five ten cent loaves.

The quantity to be used is ascertained as follows: Suppose you wish to make a mixture worth eight dollars from four brands, worth, respectively, ten, nine, seven and five dollars, and desire to know

how much of each must be taken. Set down the $8 on one side of a line, and all the other prices in the other, thus:

$$8 \left| \begin{array}{r|r} 10— & 3 \\ 9— & 1 \\ 7— & 1 \\ 5— & 2 \end{array} \right.$$

Nowconnect the largest price with the smaller, as you see above; then the next largest with the next to the smallest, as above. Now take the difference between the smallest price (5) and the price wanted (8), and set it opposite the figure with which it is connected (10); the difference is 3. Then take the difference between the price wanted (8) and the largest price (10), and set this difference opposite the number (5) with which it is joined; do the same with the next largest figures; the numbers opposite the figures give the barrels required at that price to make a mixture at 8. By halving the quantity, you preserve the same proportion, and keep the same price. The matter is easily proved:

3	barrels	at	$10	$30
1	"	"	9	9
1	"	"	7	7
2	"	"	5	10
7	"	"		$56=$8 00

The *method* by which this is worked out is called *alligation*, and may be found in most arithmetics. For a shilling or two the baker could make himself quite familiar with the rule, which might become very useful to him.

III.—THE BIN.

The flour is usually mixed in a bin built for the purpose. The following figure is about the usual dimensions. It is 8 ft. long, $3\frac{1}{2}$ ft. high, 5 ft. wide.

Each of the varieties of flour are emptied into the bin, separate in the proper proportions, and carefully spread out level. They are now mixed by

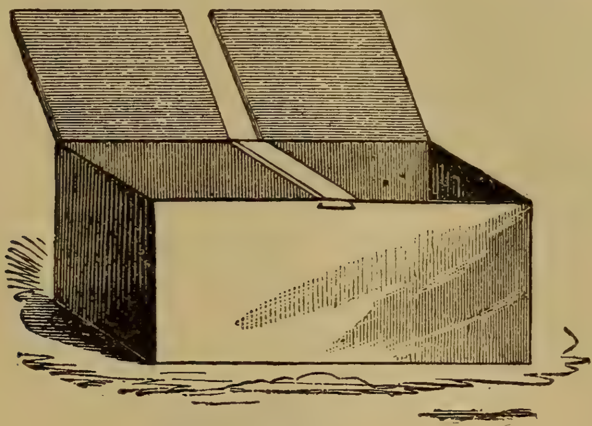

FIG. 1.—THE BIN.

cutting evenly from the back to the front, and turning over, or it is left until it is scooped out to *use*, when the same method is pursued in cutting. Sift all flour, not by rubbing, but by shaking. The bin is for DRY flour only.

IV.—THE DOUGH.

Having the flour in the trough, draw the bulk of the flour towards one end of the trough; then com-

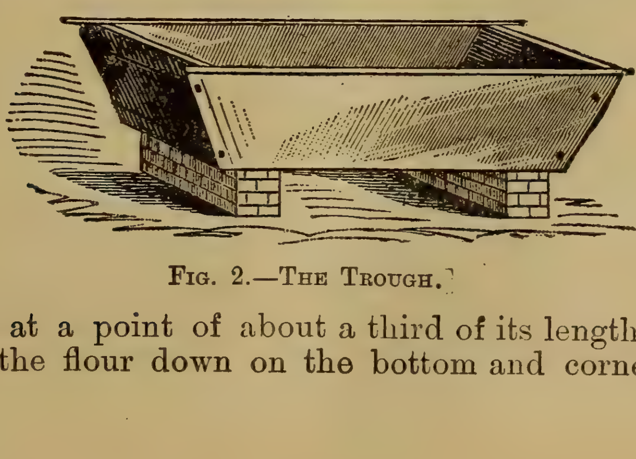

FIG. 2.—THE TROUGH.

mence at a point of about a third of its length, to press the flour down on the bottom and corners;

now insert the *bay board*, and press it down to the bottom firmly, when you will discover that, by taking the precaution of pressing the flour down, a hard bank is made, able to resist the water breaking through when time comes to *break* up the sponge, and quite a support to the bay board. The sponge is made inside the bay, as described in Section I., p. 13. No change is observed in its appearance for at least a quarter of the whole time in which it takes to come, when it gradually—almost imperceptibly at first—enlarges its bulk, until it has developed its full size. Its surface then assumes a shining appearance, and becomes level; in a little while it shows a disposition to sink gently toward the middle; this

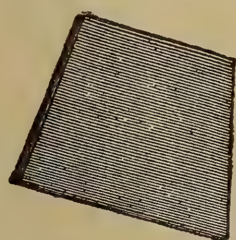

FIG. 3.—THE BAY BOARD.

is the TURN, which, gradually increasing, causes the whole surface to sink to the depth of nearly an inch; this is the FIRST DROP; it rises soon again almost to the same height as before, and falls; this is the SECOND DROP, which is seldom used in this country. After this it rapidly spoils, getting sour, by reason of its generating a superabundance of carbonic acid gas, acetic, formic, and butyric acids; the starch is converted into sugar and alcohol, the gluten completely breaks down; in short, *it is worthless.*

As shown in Section I, the sponge contains three pails of water. When the sponge is at the first drop, pour in a pail and half more water, with eight ounces of salt to the pail dissolved in it. If desirable to use warm water (as in winter) at any stage

of the proceedings, it is best to use it in setting the sponge, and cool water when mixing the dough. Thoroughly break up the sponge, remove the bay board, scrape it off, and proceed to make the dough. After "shaking in" (sifting in the flour), haul it to a heap, scrape the end, turn it over twice, and, throughout the whole making, *well knead it.* In spite of what is said against it, I again say, *well knead it.* The grain of the bread is improved, and the loaf is better for it in every way. The dough may now be left from a half hour in summer to two in winter to (so-called) rise.

V.—HOME-MADE BREAD.

When the dough is ready, scale as many loaves, one pound and six ounces each, as may be needed; mould them round, and lay in the boxes; when all the dough is scaled out, and in boxes, proceed to

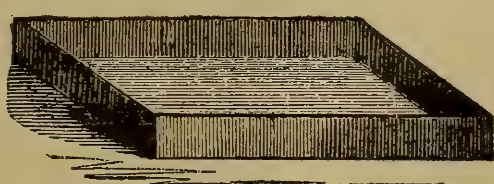

FIG. 4.—THE BREAD PAN.

mould them long, and lay in a bread-pan, two loaves deep, end to end, and six in a row, twelve in all, to prove. To *prove* means only to *rise*, the idea being that the rising of the loaf *proves* that the ferment has been, and still is, doing its duty in lightening the bread. When this process has gone far enough, the bread is subjected to the heat of the oven, which checks any further rising by driving off the carbonic acid gas; the passing off of which causes the *holes* in

bread, and its consequent lightness. Some bakers are of the opinion that "prove" is a corruption of the word "improve," as if the rising allowed the bread, after moulding, was an improvement or bettering of its condition. The writer of this thinks the latter the proper explanation. When the loaves do not prove rapidly enough, cover with a blanket or cloth. Eight-cent home-made are scaled 17 ounces; five-cent home-made are scaled 12 ounces.

VI.—CREAM BREAD.

3 pails of sponge;
3 pounds melted lard;
2 " " butter.

These must be melted with very moderate heat. Add to the sponge when breaking up. Then add

$1\frac{1}{2}$ pails of water, with
12 ounces salt, and
3 " sugar (brown or coffee crushed)

dissolved therein. Make the dough as usual, working well, and allowing it to stand half an hour. Scale from 24 to 28 ounces, mould round, put into the tins, and thence into the proving box for ten to fifteen minutes. It sells for 12 cents, except when scaled lighter; 20 ounces are sold in some neighborhoods for 10 cents; in some neighborhoods, however, it sells for 10 cents when it is scaled 1 pound 3 ounces.

VII.—TWIST BREAD.

As much home-made bread dough as may be needed is taken, and stiffened with flour, and scaled out a pound and a half for 12 cents. As it is scaled, each piece is broken into two unequal parts, both

parts divided in three pieces, braided, the surface of the larger one washed with water, the other piece

Fig. 5.—The Peel.

laid on it, and, as they are made, placed on the "peel" and put into the oven at once.

VIII.—SPLIT BREAD.

Scale off one pound and six ounces home-made bread dough; mould them into the boxes; when almost ready to peel, mould in shape of home-made,

Fig. 6.—The Pin.

(2 ft. long, ½ in. diameter. For making split loaves and rolls.)

lengthwise of the loaf, and with the pin (Fig. 6) split clear down to the board, pass a grease brush

Fig. 7.—The Grease Brush.

in the split, lay on the tin, end to end, like home-made, passing the brush between each side and end, and set in the oven after a few minutes' proof. (The brush is dipped in melted lard.)

IX.—GRAHAM BREAD.

Take out as much sponge as may be needed; to every pail add half a pint of molasses; make the

dough with unsifted Graham flour; scale each ten cent loaf a pound and 8 ounces, and mould at once in the tins.

X.—RYE BREAD.

Take as much sponge as needed; to each pail allow six ounces of coffee-crushed sugar, and make the dough with rye flour; make about the ordinary size; scale it off 1 pound 4 ounces; mould them round; lay in boxes, and, when ready to "peel" them, mould them long and tapering at the ends; when on the "peel," cut them across three times, and brush over with milk or water.

XI.—BOSTON BROWN BREAD.

Make a strong ferment of two quarts of potatoes, a quart of yeast, two pounds of flour, and a pail of water; mix in a trough ten bin-scoops of yellow Indian meal, eight of rye flour, and three of flour and two of Graham; mix, make a bay (Section V). Add to the ferment half a pail more water; strain into the bay, and set sponge; take it at first drop, make dough soft, and scale one pound and eight ounces for 10 cents. Fill the tins at once, and bake two hours in a slow oven.

Boston Brown Bread, No. 2.—Ferment as in previous recipe. Have ready six hours before setting sponge. For sponge and dough use equal parts of rye and yellow Indian meal. Set the sponge, and, when ready, which will be perceived by the breaks on the surface of the sponge, add three quarts water, five quarts molasses, five ounces soda, seven ounces salt, and sufficient rye and Indian to make a thin dough. Put into the tins, bake with the top on in a slack or exhausted oven five or six hours.

Boston Brown Bread, No. 3.—Sixteen pounds rye flour, 32 pounds Indian meal (yellow), 8 pounds Graham flour, 1 quart molasses, 4 quarts ferment as in No. 1; mix stiff with lukewarm water; cover with cloth, and allow to stand *ten hours;* put into mould, and bake five to six hours; take the cloth off, if it comes too rapidly.

XII.—FRENCH BREAD (Ordinary Dough).

Make a strong ferment of 2 quarts of potatoes and 3 quarts of yeast, scalding 5 pounds of sifted flour with the liquor which the potatoes were boiled in; pound together fine, and dilute with 2 pails of water according to temperature; add to it, at the end of six hours, 3 pails of water; make the sponge average size, and give it a full "first drop," and make the dough fairly stiff, without adding any more water; let it "come" well, take it up and well knead it. It is then ready for any of the following varieties of French bread:

French Rolls.—Break pieces off the French bread dough of the size of an egg; dust the board; mould under the hands; lay up in rolls, and cover with a cloth as fast as laid out. When as many are moulded as are needed, lay the cloth on the boxes; wash the tops of the rolls with melted lard; draw the rolls, two at a time, to the edge of the bench, and with the pin press them in the centre clear down to the wood; reverse them, and lay them four in a row in the box or a cloth; draw up the cloth to form a division between each row, and repeat until the whole of the rolls are completed; lay them in a warm situation ten to fifteen minutes to prove; peel, and set them on the oven bottom.

Split French.—Scale of French bread dough, one pound four ounces for ten-cent loaves; mould them round, dust the board, lay out, and cover;

when all are moulded, mould again into loaves sixteen inches long, tapering at each end; wash with melted lard, dust the board with white Indian meal, and with the pin press in the centre of the loaf down to the board, and roll just a little—say out an inch; reverse, and lay out on cloths (as for the rolls); when about to peel, take the loaves up on a thin piece of wood twenty inches long, six broad, and half an inch thick, and slide off on the peel, and bake on the oven bottom.

FUTE.—Scale French bread dough one pound five ounces; well grease the pans; as fast as scaled out, roll out under the hands to the length of the pans; lay them in, and, when "proved enough," set in the oven.

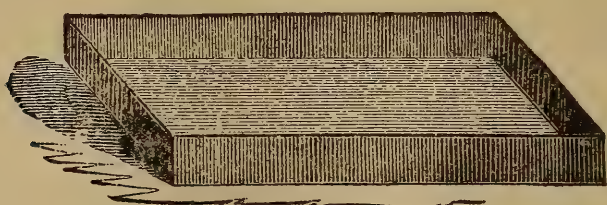

FIG. 8.—FRENCH BREAD BOX.
(18 in. long, 8 in. wide and 4½ in. high.)

FRENCH, No. 3.—Scale French bread dough one pound four ounces; mould them long, thirty inches; lay on the cloth in boxes; when on the peel, cut three times, obliquely, with a sharp knife; wash over with milk and put into the oven.

XIII.—THE OVEN.

The same construction of oven is used in American and French bread; constructed to burn coal or wood.

There are many methods of determining the heat of the oven. The most usual is by the area of white

heat that appears on the walls and crown, and, as the ovens differ in height and surface area, it is very difficult, and almost dangerous, to give rules

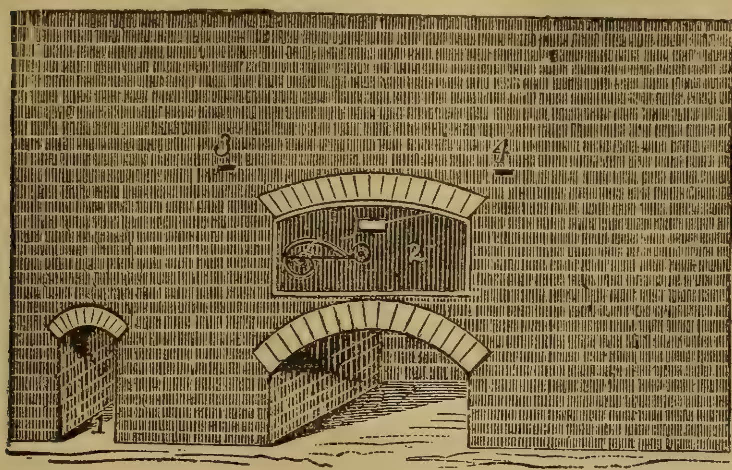

FIG. 9 is front elevation. 1 shows the ash-pit; 2, the oven door; 3, the rod to valve to clear the oven of smoke and steam; 4, the rod to valve of chimney flue.

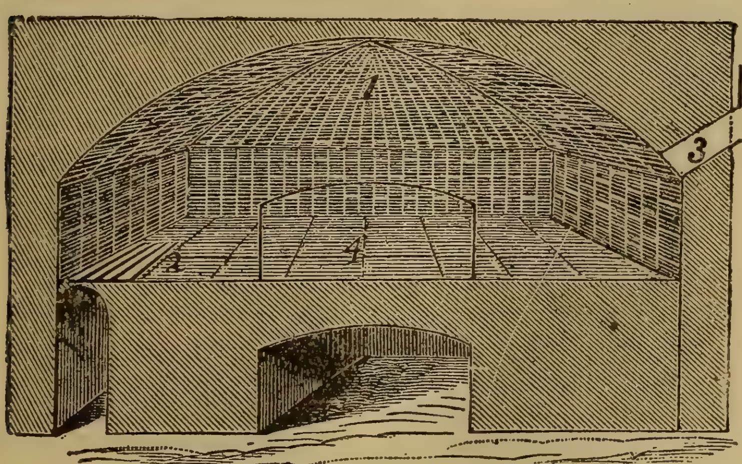

FIG. 10 is the interior of oven with outline of oven door; the position of bars (2), and chimney (3); 1, the crown; 4, 4, 4, the bottom.

of advice about this question. Nothing but experience and close attention to each oven as to what it can do, and how it does it, will determine the rules to be applied to individual cases. In ordinary ovens, 510° to 512° Fahrenheit is considered a proper heat to begin on, as it drops some thirty degrees during a baking. The rule of thumb used by bakers is to sprinkle some flour as far in as can be plainly seen from the mouth. If it turns a yellow brown, it is too hot; if it remains pale, it wants heat. When the oven is considered hot, it is mopped out with a piece of sacking tied to the end of a stout pole, dipped in clear water, and swung round on the oven bottom, washed once or twice; when the oven is considered clean, and cooled down, the door is shut up tight, and the heat diffused evenly through the oven; it is then ready to fill.

XIV.—FILLING THE OVEN.

The large pans of home-made bread are placed around the walls of the oven, the tinned loaves next, and the middle filled in with twist, smaller home-made, etc., and the fire is well banked up with old tins, pieces of thick iron, etc., to keep the flush from spreading over the crust of the bread.

XV.—VIENNA BREADS.

Sponge and Dough.—Dissolve eight ounces compressed yeast in sixteen quarts milk (at 90°) and sufficient flour to make a thin sponge. In about two hours the sponge will be ready. At this point add eight quarts milk, containing one pound of salt, to the sponge, work up well, and then add flour for your dough, kneading well. When done allow to stand an hour and a half. This dough is used for the following shapes of bread, most of which are now very popular here:

Seven varieties of this are small bread, and two of large bread, as follows: Kaiser-Semmel (lady loaves), Saltz-Kipfel, Milch-Kipfel, Lutter-Strizl, Mohn-Strizl, Kipfel and Kaiser-Kipfel; Large Vienna and French (of Vienna bread dough).

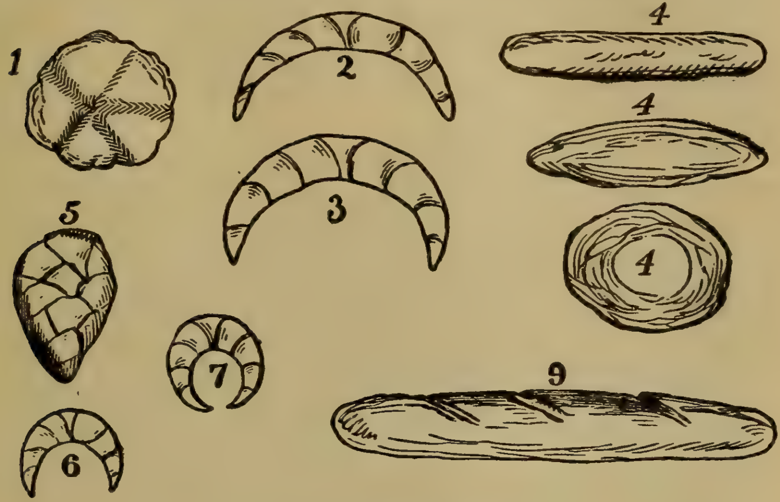

FIG. 11.—VIENNA BREADS.

1, Kaiser-Semmel; 2, Milch-Kipfel; 3, Saltz-Kipfel; 4, 4, 4, Lutter-Strizl; 5, Mohn-Strizl; 6, Vienna-Kipfel; 7, Kaiser-Kipfel; 8, French Bread.

XVI.—OVEN FOR VIENNA BREAD.

Previous to giving the mode of preparing these, we will say a word on ovens for this kind of bread. The bottom slants about six inches toward the front, fitted with a balance sliding door, and the oven is from 11 to 12 deep from front to back. Gas for illuminating the oven is admitted by means of the aperture, the top of the burner being at a level with the bottom of oven. The oven is heated with wood, and cleaned in the usual manner, after which a piece of wood an inch and a half thick, and long enough to reach down to within four inches of the bottom of the door, is fitted in. This is to prevent the escape of steam. The three valves are for use as follows :

Damper, connected with the chimney flue to empty the oven of steam, the other communicating with the stop-valve of the water-drum at the back. It consists of a conical boiler, built in the back wall, having a perforated iron pipe running across the oven. When the valve-rod is drawn, the hot water from the drum drops on the oven bottom, and so makes the steam needed to produce the surface gloss so much desired.

The steam is the active agent in producing the golden crust, and hence this result may be attained

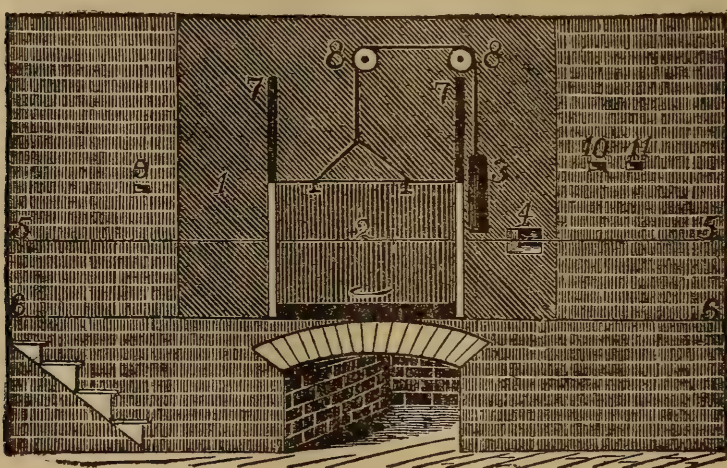

Fig. 12 is the front elevation of oven. 1, 1, 1 is iron work; 2, the sliding door; 7,7, the grooves in which it works; 3, the balance weight; 8,8, wheels on which the chain works; 4, aperture to admit gas; 5,5, level of oven bottom; 6, 6, 6, 6, the level of floor of bake shop; 9, valve-rod to clear the oven of steam; 10, valve-rod to drum; 11, valve-rod to chimney.

without such an elaborate oven as above. Small bakeries have succeeded very well by merely putting in the oven a small quantity of clean wet straw.

The Kaiser-Semmel.—The Kaiser-Semmel weigh eight to the pound; after being moulded under the hand, a loaf is flattened with the heel of the right hand, while with the left hand it is turned round;

after each stroke the loaf is turned over, the thumb of the left hand is placed at the centre of the loaf, and a fold completely turned over it; the heel of the right hand strikes a gentle blow at the side and parallel with the thumb, and another fold turned over, until five folds have been made, when the little end of dough left at the last fold is turned in the opening eft by the removal of the thumb; they are now re-

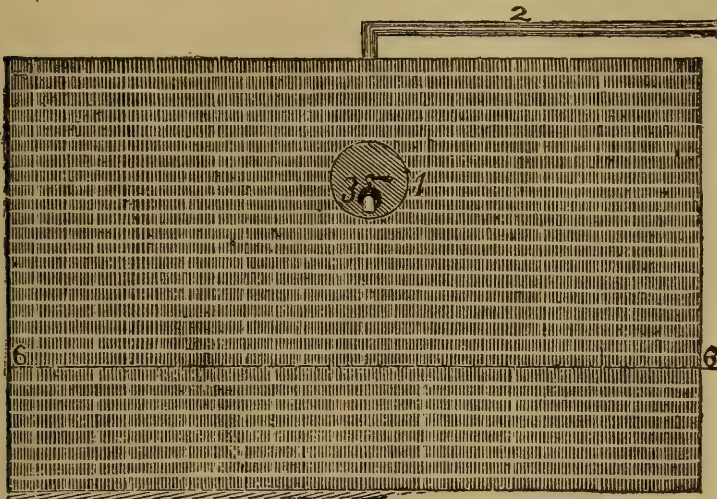

FIG. 13 shows the back elevation of oven, with 1, the exposed end of water drum; 2. the water pipe from connection; 3, the faucet.

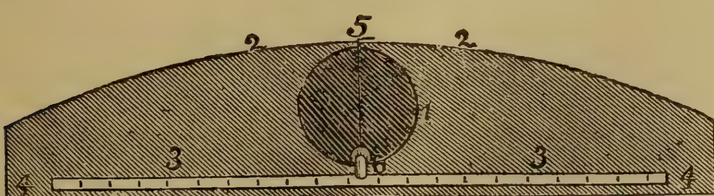

FIG. 14 shows section with interior end of drum, 1; 2,2, crown; 3, 3, iron perforated pipe; 4, 4, bottom level; 5, valve-rod to open and shut valve to pipe (6).

versed on a cloth in a box until "proved," when they are taken to the oven, "set" on the bottom, the door closed, and the valve opened in the drum, and

the oven filled with steam. In about seven minutes they will be ready, when, as they are taken out, they are washed over with milk.

THE MILK-KIPFEL is made of the same dough as the Kaiser-Semmel. Weigh them ten to the pound. After moulding under the hand, they are driven in one direction as thin as possible; then, holding one end in the left hand, the right is employed in rolling them as light as possible, pressing as well as rolling to make them long in proportion; then, when all are made, lay them in the shape shown at plate on tins; when "proved" a few minutes, bake on the tins.

SALTZ-KIPFEL.—Proceed as directed for milk-kipfel, weighed twelve to the pound, sprinkling coarse table salt and caraway seed in equal quantities on their surface, previously well washing with milk to make them stick; when "proved," bake.

LUTTER-STRIZL.—These are weighed eight to the pound, and made as Figs. 4, 4, 4; lay up on tins, and wash; as soon as "come," bake as usual.

MOHN-STRIZL.—Weighed ten to the pound; divide each in half; roll out under the hands about three and a half inches; then cross them in the center of each, which will make four ends, and braid; lay up on a tin; wash and cover with *mohn* (poppy) seed; when "proved," bake as usual.

VIENNA KIPFEL.—To six pounds of dough, when made, rub in a pound of *good* butter; when ready, weigh sixteen to the pound, and proceed as directed for *milk-kipfel*.

KAISER-SEMMEL.—Proceed as directed for Vienna kipfel, only, in laying on the tins, draw the ends almost together, as shown at Fig. 11.

FRENCH BREAD (of Vienna Bread Dough).—Weigh one and a quarter pounds, and proceed as directed for French bread in Section XII. Sell at 10 cents.

VIENNA BREAD.—Weigh one and a quarter pounds; mould sharp at each end, and lay a strip of dough

along the top, and fasten at each end; when "come," bake on the oven bottom.

VIENNA BREAD, No. 2.—Weigh out the dough into pieces of one and a quarter pounds; roll out so as to be thick in center, and bluntly pointed at each end; allow ten minutes to "prove;" cut three cuts diagonally across the top. This is the most approved New York style.

XVII.—GRISINI (ITALIAN BREAD.)

Mix the *dough* off-hand; to each quart of milk, at 100°, allow an ounce of yeast, half an ounce of salt, and two ounces of butter (melted); mix into a firm dough; then roll thin; cut into long strips, four inches wide; then roll up tight to the thickness of a lead-pencil; lay on the tins, and set in a warm place to rise for two hours and a half; bake in a sharp oven a light color.

XVIII.—GRAHAM BREAD (No. 2).

Of ordinary sponge take one ten-quart pail; add one-half a pail of water, three-fourths of a pint of molasses, and eight ounces of salt, and mix thoroughly; then add Graham meal sufficient to make a thin dough; let it stand until risen; form at once into loaves; put into the moulds and allow to "prove" but a few minutes, as it is apt to sour quicker than flour bread. (See also No. 10.)

XIX.—OAT MEAL BREAD

As Graham bread.

XX.—WHEAT AND INDIAN.

In many parts of the country this is preferred, especially by laboring men, to finer bread. It is best

made by taking sponge, after it has been thinned with water, as mentioned in Section I. on "Sponge," then making a thin dough with half wheat flour and half *scalded* Indian meal. One ten-quart pail of thin sponge will require six ounces of salt. Then allow to rise; mould into large round or square loaves; "prove" five to ten minutes, and bake one and a half to two hours—the longer the better.

XXI.—RYE AND INDIAN.

Rye and Indian is managed in the same way, using the ordinary sponge.

XXII.—ASTOR HOUSE ROLLS.

Into two quarts of flour put a piece of butter size of an egg, a little salt, one tablespoonful of white sugar, one pint of milk, scalded and added while warm, half a cup of yeast, or one small cake. When the sponge is light, mould for fifteen minutes; let rise again, roll out, cut into round cakes; when light flatten with the hand or rolling-pin, place a piece of butter on top, and fold each over itself; when light, bake in a quick oven.

XXIII.—MUFFINS.

Of late years a large trade has sprung up in the Atlantic cities in muffins, particularly among people of English birth. Its companion, the crumpet, has also been introduced, but has not proved so popular. We will, however, give the method of making both.

To make these in perfection, it is essential that the flour should be of the best kind, and rather not too new. The following is the English method for *muffins*.

To each quart of water, which should be about the warmth of new milk, or from 70° to 80° of Fahren-

heit's thermometer, add one ounce of German yeast, one ounce of salt, and about three and one-half pounds of flour, or rather more if it is of weak quality. Mix well together in a tub or pan, and beat the dough well up with a stick until it becomes smooth and tough. Then set it aside in a warm place, covered with a thick cloth or flannel. When the dough has risen about three or four inches, beat it well up again with the stick as before, and set it aside to rise about six inches, taking care that it is well covered, and in a warm place. It will be then ready to turn out.

When brewer's or small-beer yeast is employed, use a quarter of a pint or rather more to each quart of water, with an ounce of salt. Proceed in the same way as directed for German yeast in the paragraph above.

To Form the Muffins.—When the dough is ready, proceed to "turn them out" by forming pieces of dough of about four ounces into round smooth balls in the bowl of a wooden spoon, with a knife. The spoon is to be held in the left hand, and the knife in the right; the dough is then taken up in small portions with the spoon, separated with the knife, and formed into balls, all which require considerable dexterity and practice to accomplish. As these are formed, they are scooped out of the spoon with the knife, and laid in rows, about three inches asunder, in shallow boxes about half filled with flour, and holes made in it with a piece of wood, about an inch and a half or two inches deep, to prove.

Instead of the boxes half filled with flour, some prefer the bottom of the boxes to be covered with a piece of sack, which they well dust with flour, and lay the muffins on it as they are formed. Each box should contain from two dozen and a half to three dozen of muffins, and, as each one is filled, it should be covered by another, until the whole of the dough is disposed of in this manner.

When the last box is filled, the first "turned out" in general are near about, if not quite, ready to be baked. When German yeast is used, this is mostly the case, but with small-beer yeast they may have to remain close covered in a warm place for a short time before being sufficiently proved to admit of their being baked.

To Bake Muffins.—While the muffins are being prepared thus far, the stove should have been heating, so as to be hot by the time they are proved; but before describing the method of baking them, it will be necessary to give a little advice with regard to the stove. For this purpose, we will suppose that the stove, as is usually the case, has not been used for the summer, or during the time that muffins are considered out of season. It will therefore be dirty, and not fit for immediate use.

To Clean the Stove, proceed thus: Have some fine sand, such as is strewed over floors, or mixed with mortar, and place a handful over the top; moisten it with water, and, with a piece of pumice stone or a brick rub it well all over for nearly half an hour; then wash off the sand, wipe the plate dry, and proceed to heat it. When it is nearly hot, sprinkle some salt over the plate, and give it another good rubbing with a piece of old sack. Brush the salt off clean, and it will be then fit to bake on.

To know when the stove is hot enough for baking, sprinkle the plate lightly with flour, and on those places where it turns a fine brown or gold color, it is there hot enough to bake on; where it burns quickly it is too hot. Some ashes should then be put on the fire over the place where the heat is too much. The stove being heated to 405° or 410° Fahrenheit, brush off the flour, and proceed to bake them. Take them from the trays, one at a time; throw them from one hand to the other gently on the open fingers, two or three times, so as to

deprive them of as much flour as possible that may be adhering to the bottom, and drop them with the flour side downward. Put them in rows, so as not to touch each other, on flat sheets of tin, which may be taken up by the peel as required, and when bladders appear on the top, ready to break, proceed to turn each of them at that point over on their unbaked surface. In doing this, use a broad, long pallet knife to take them up with, and be careful to turn them on to a clean place; if on the spot a muffin has just been removed from, be careful to first brush off the flour. Proceed in this manner until the whole are finished.

Before being offered for sale, scrape and brush the bottoms free from flour; using, for this purpose, a brush similar to a clothes or shining brush for shoes.

Muffins are here, and often in Europe, baked in tin rings and in the ordinary oven.

XXIV.—CRUMPETS.

These are not so difficult to make as muffins, yet there is required considerable practice to produce good ones. Cleanliness is essentially necessary, as they take up every particle of dirt that may be about the oven or hoops.

The modern crumpets are all baked in shallo tin hoops.

To Season and Prepare New Hoops.—Put them into a pot or saucepan with clean water to cover them, and a handful of salt; let them boil for five minutes; then take them off, and allow them to cool in the water; next pour off the water, wipe them dry, and rub over the inside of each hoop with a little sweet-oil, melted lard or butter, and they will be ready for use; at first they will require a little

more butter or lard to be rubbed over the inside than after they have been used for baking two or three times, as the metal then becomes impregnated with the oil or grease used; afterwards a small portion only is required to be used each time of baking in them.

To Make Crumpets.—To each gallon of warm water, add four ounces of salt, one-half pint of small-beer yeast, or from two to three ounces of German yeast, with ten to twelve pounds of flour. Mix into a smooth batter, stirring it well with a stick; let it stand close covered in a warm place to "work through" like a ferment; then stir it down, let it rise again, and then proceed *to bake them.* This is usually done after the muffins are all done, and the stove at a good heat for baking; but in order to ascertain if it is so, dip the crumpet ladle in the batter, and with what there may be adhering to it, dab the stove all over in little spots; where the batter is of a fine gold color, place the crumpets: but those places where it is burnt will be too hot; the best heat for baking them is 350° Fahrenheit.

Before placing on the hoops, see that the stove is perfectly clean; then put them on in rows nearly touching each other, and put into each hoop a ladleful of batter; when the bottoms are of a nice brown, turn them with the crumpet knife over on the other side; in about two or three minutes they will then be done, when they are to be taken off with the knife, and placed on a table or board by the side with the hoops; after they have cooled a little, take out the crumpets, and rub the hoops over with a little oil or melted lard for another baking. If, in the baking of them, the crumpets are "too rash"—that is, too light or free—stir the batter every two or three rounds.

When muffins are wanted in large quantities, the range or stove must be arranged accordingly.

XXV.—BUNS AND RUSKS.

Buns and rusks are more popular in England, but there are parts of this country where they sell well. We give the London methods first, and will afterwards give the plans used here, which are less particular.

Remarks.—In the manufacture of buns or cakes, observe that more yeast must be added, in proportion as the mixture is "richer" than plain bread or roll dough. The extra ingredients which may be added to the flour require more to raise it and make it light, particularly butter, as anything of the nature of fat or grease hinders fermentation; therefore more is required to counteract it; *a little sugar accelerates it.* An excess of sugar hinders fermentation, as it acts as a preservative, unless it is acted on with more yeast, and mixed with other substances.

Strong-beer yeast that will produce good bread will not make good buns, and *contra;* this is frequently occasioned by the bitter quality of strong beer yeast, when sufficient cannot be added to meet the exigencies of the case without imparting to it a disagreeable flavor. Small-beer or German yeast may be used more freely, especially the latter, care being taken not to use too much to make them "rank;" that is, too light. Two ounces of this, when fresh, are sufficient for a quart of milk, when made into buns of the usual quality. When no butter or sugar is added, one-half of this quantity will be enough; observe, in summer time rather more should be used, as it is then frequently out of condition; the same should be done when it is rather stale.

With small-beer yeast, much will depend on its quality, which varies very materially; in general, about half a pint will serve for the quantity here named, but experience alone can determine it with exactness. Yeast that is so bitter as to render it unfit for use should be "washed." This is done by pouring on it a quantity of clean cold water in a pan

or pail, and then letting it settle; the yeast will fall to the bottom, and the water is then to be poured off, and, if required, treated a second or third time in the same manner, when it is considered fit for use.

Care should be taken that the water or milk is not so hot as to scald the yeast, as that would render rusks quite heavy; the same observation holds good with respect to the flour, for, if that is scalded, the same effect is produced, although the yeast may not be so; for the gluten of the flour is injured by it, and the starch is converted into a jelly, so that the "life" of the flour, as it is termed, no longer exists with it, and the yeast remains almost inactive. The gluten has not the power to expand itself, and receive the fixed air resulting from the gasefication, the surface of the dough will appear in bladders or bubbles, and it otherwise looks greasy and flabby, having a heavy feel, similar to glaziers' putty.

In "seasoning" milk for BUNS WITH SMALL-BEER YEAST, when it has not been previously washed, add as much as will impart to it a slight taste of the yeast. The buns, even then, if they should be rather heavy, will at times sell much better than if they are bitter; therefore, of two evils, if one must be, choose the least. From a quarter to half a pint of good small-beer yeast will be required for each quart of milk.

Observe.—A quart of milk, when made into a dough for buns with German yeast, will take about four or four and one-half pounds of flour in the whole; and the same quantity of milk with half a pint of small beer yeast, will take about five pounds of flour. With these rules and remarks, it will be unnecessary to mention anything relating to it again under the various recipes.

To Keep German Yeast.—This yeast is so universally used in the metropolis, as well as other places, that a few words will be necessary on this head.

1st. Care should be taken that it is not thrown

down, or in anywise bruised by falls, or it will be spoiled in consequence.

2d. When the yeast is delivered in a dry state, it should be then kept in a cool, damp place; if in a damp condition, in a dry, cool place.

3d. In summer time this yeast can, for quick use, be kept in a good condition for a longer period than otherwise, by putting it into cold water (say one pound of yeast to a quart of water), and standing it in as cool a place as possible.

Use it with the water, in the same proportion as otherwise; with the quantity above given, half a pint will be equal to a quarter of a pound of dry yeast.

PLAIN BUNS.—One-half pound of butter, one-half pound of sugar, one quart of milk. Or,

Twelve ounces of butter, twelve ounces of sugar, three eggs, one quart of milk, and sufficient flour to make a dough. Some prefer the addition of spice, in which case, take of caraway, coriander, cassia, and allspice, mixed in equal portions and ground, one-half ounce; less allspice and caraway are preferred by some, so as not to give the buns so dark a color.

Warm the milk to about 70° or 80° Fahrenheit's thermometer; add the yeast with *a part* or the whole of the sugar, and about six ounces of flour, or sufficient to make it a weak sponge; mix it well together, and put it in a warm place to rise or ferment; when ready, a head will be formed on the top, which will be quite flat, leaving a mark round the side of the pan or tub, to the height where it has risen and again fallen. If you see a white foam coming through the head or surface of what has formed on the top of the sponge, it has not acquired the proper degree of fermentation, as it will rise higher and fall, leaving a mark, as already stated. Be very exact on this point, as the other process is considerably retarded when the first fermentation is not complete; that is, if the dough is made before the sponge begins to fall, although many deny this. Let the sponge have time

to lie and recover itself until it has a fine cauliflower head, but not before.

Rub the butter in with about four pounds of flour to each quart (in winter it may be melted to an oil, but it must not be made scalding hot), make a bay with the flour, pour it in with the sponge; add the remaining portion of the sugar and the spice; mix the whole into rather a soft, mellow dough, cover it with a cloth and let it prove. When it is ready, weigh it in pieces of one pound two ounces each, and make six or seven two-cent buns out of each piece, or weigh four ounces and a half or five ounces of dough for two buns; mould them up lightly under the hands, and place them about four inches asunder, on warm tins, slightly rubbed over with butter.

When a tin is full, put it at once into the proving oven, or a close closet, similar to a cupboard, having racks or bars of wood about four inches asunder, fixed in at the back, on which the tin rests. This "proving closet" should have two sliding shutters or doors in front, the same as a window-sash—the one made to slide up and the other down; the buns are proved in it by steam. These closets occasionally have a small *crock* or iron pot fixed at the bottom, or by the side, with a fireplace underneath to heat the water and make it boil; a cover or cap is put on, having a small pipe in the center; and if it is outside, the pipe is bent, so as to convey the steam to the bottom of the closet; an old tin is placed next to this, that it may be more equally diffused, and also to prevent too great a heat injuring the articles which may be placed near it; the steam may be regulated at pleasure, by taking off the cap or hood in one case, and by lessening the fire in the other. A more rude and simple contrivance for heating and steaming the closet is often resorted to, which consists in heating several large pieces or old bars of iron red hot, in the oven fire; these are placed in the bottom, and water is thrown over them, which causes a steam.

Another Method, in common use in London, for proving buns and rusks, is, to place sticks across the dough trough at the distance of about four inches, one above the other for the tins to rest on. In the center is put a tub or pail with a *little* water in it; into this some red-hot pieces of iron or brick are thrown, which create a steam; the lid is then shut close to confine it, and keep in the heat. Where bread is baked, some loaves are placed over the bottom of the trough as soon as they are taken from the oven; this answers the purpose admirably, and in this case the irons and water are not required.

When they are put into a proving iron to prove, water should first be thrown on the sides and bottom; these precautions of creating a steam and excluding the air are to prevent the tops of the cakes or buns drying, and to keep up the temperature, which should be about 100° or 110° of Fahrenheit's thermometer, otherwise the surface of the buns or cakes would get hard by forming a crust, which would crack, spoil their appearance, and prevent their expanding to the required size.

Too much steam and heat will also cause them to run, and become flat, neither will they have a bold, round appearance; their edges will be sharp and thin, the same as a heavy bun, and the surface will often appear ragged and broken; there should be just enough steam to keep the surface moist, and heat sufficient to raise them, without their being dried or hardened.

The heat should be gradual at first, so as not to "force" them too much in the commencement, but it may be raised towards the end, if they are required in a hurry.

If steam is not applied, the tops must be occasionally washed over with milk or water.

When they are sufficiently proved, bake them in a hot oven; as soon as they have a good bottom, they are done; take them out and brush over the

tops with egg and milk, or water, mixed together in the proportion of two eggs to a half pint, which will give them a gloss.

Currant Buns.—To either of the mixtures for plain buns, and one and one-half or two pounds of currants, with one-half pound or six ounces of preserved orange and lemon peel, cut in small, thin bits; mould them up round under your hands, about the same size as the others; either cut them round the edge with a knife, or put them on the tins quite plain; prove and bake as the last. If they are required very rich, the following mixture may be used.

Rich Currant Buns.—One pound of butter, one pound of yellow sugar, four or five pounds of clean-washed and picked currants, one-half pound of candied peel cut small, and one-half ounce of mixed spice, one quart of milk, with flour sufficient to make the whole into a dough, as before directed; make eight penny buns out of one pound of dough.

Good Currant Buns.—Four pounds of flour, twelve ounces of butter, twelve ounces of sugar, one and one-fourth pounds of currants, three cups of lemon and orange peel, three small cupfuls of small-beer or well-washed strong-beer yeast, or two ounces of German yeast, and sufficient warm milk for the sponge and dough; about a quart in the whole.

Balmoral Cakes.—Three and one-half pounds of flour, one pound of butter, one pound of sugar, five eggs, nearly a quart of milk, a few caraway seeds, with one and one-half ounce of carbonate of soda and tartaric acid, mixed in the proportion of one ounce of soda to three-fourths of an ounce of acid. Mix the soda and acid well with the flour, then rub in the butter and sugar; make a bay with the flour, add the seed, beat up the eggs with the milk, and make the whole into a dough. Put into buttered pans, according to the size, dust with powdered loaf sugar, and bake in a moderate oven.

Balloon or Prussian Cakes.—Take currant bun

dough, and make into a round, flat cake of any required size, and place it on a buttered tin. When it is about half proved, divide it equally into any number of parts with a long, flat piece of wood, having a thin, graduated edge, and place it again to prove; when it is proved enough, brush over the top lightly with the white of an egg whisked to a strong froth; dust it with finely-powdered loaf-sugar, and sprinkle it with water just sufficient to moisten the sugar. Bake in rather a cool oven, to prevent the icing getting too much colored.

Chelsea Buns.—Take plain bun dough, or, if they are for common use, bread dough; roll it out in a sheet, break some firm butter in small bits, and place over it, fold it up, and roll it out as you would paste; after you have given it two or three turns, moisten the surface of the dough, and strew over it some moist sugar, roll up the sheet into a roll and cut it in slices, or cut the dough in strips of the required size, and turn them round, place them on a buttered tin that has edges, about one-half inch from each other; prove them well, and bake in a moderate oven. You may dust the tops with loaf-sugar either before or after they are baked. The quantity of ingredients used must be regulated according to the richness the buns are required; one-half pound of butter and the same quantity of sugar, with four pounds of dough, will make a good bun. When bun dough is used, half this quantity of sugar will be sufficient, and some omit it altogether.

Another.—Five quarts of bread dough, one pound of butter, and one pound of sugar; or, six ounces of butter and six ounce of sugar to each two quarts of dough, and proceed as before.

Cross Buns.—Take eight quarts of warm milk, and set a sponge, with four pounds of yellow sugar, and sufficient yeast and flour; when the sponge has risen and fallen, add four quarts of warm water, and either two or four pounds more sugar, and four or six

ounces of mixed spice. In the meantime, rub six or eight pounds of butter into some flour, and mix the whole into a nice, mellow dough. When it has laid about half an hour, make it into buns as directed for plain ones, and place them on warm tins. As soon as they are half proved, cross them with a cross made of tin, with the sides forming two sides of a triangle, which is fixed into a round plate with a handle on the top; this is much better than those made with two straight pieces crossed. The cross should be about two inches and three-quarters long, that it may not separate the buns at the edges; give it a twist, so as to open and completely divide them in the center. Wash them with milk, and finish proving them; bake them in a hot oven, and wash over the tops again when they are done with egg and milk. If you have not convenience to make a batch of this size, make one-half or one-third the quantity, as it is always better to make two small batches than let the dough lie and get cold, which wastes time, and they are not then so good. Some of the batches will require to have currants in them; in this case add from ten to fourteen pounds of currants to this quantity.

Bath Buns.—One pound of flour, eight ounces of butter, eight ounces of loaf-sugar, four eggs, a little warm milk, one ounce of German yeast, or one-half or three-fourths of a teacupful of small-beer yeast, some citron peel, cut small, and one-half a nutmeg grated; this will make fourteen twopenny buns.

Or, two pounds of flour, three-fourths pound of butter, three-fourth pound of loaf-sugar, six or eight eggs, a little milk, candied peel and yeast. Rub the butter in with the flour, make a bay, and break in the eggs, add the yeast, with sufficient milk to make the whole into a dough of moderate consistence, and put it in a warm place to prove; when it has risen enough, mix in the peel, a little essence of lemon, and the sugar, which should be in small knobs about the size of peas; this is best done by

chopping it with a knife, which will make the dough jagged or ragged; then with a knife or spoon divide it into pieces for buns, and put them on a clean tin, not buttered, about four inches asunder; let the surface be rough and uneven; the tops may be washed with egg and dusted with loaf-sugar; put a few caraway comfits on the top of each, prove them in a gentle heat, but not so much as you would buns, and bake them in a moderately warm oven; when they are about half done, put a tin or two under them, to prevent the bottoms being burnt.

Sally Luns—Yorkshire or Tea Cakes.—One quart of milk, one-half pound of butter, one-fourth pound of loaf-sugar, and flour.

Or, one quart of milk, one pound of butter, one-fourth pound of sugar, with flour sufficient to make the whole into a dough.

Set sponge and make into a dough as for buns, butter some rings or hoops, and place them on buttered tins; weigh each twopenny cake either five or six ounces, mould them up round, put them in the hoops, and flatten them a little with your hand. When they are about half or three parts proof, make a hole in the middle of each with a stout piece of wire or stick; finish proving them, but do not let them be too much proved, as they will then eat poor and dry. Bake them in a moderately brisk oven; when they are done, which will be in about ten or fifteen minutes, take off the hoops, and brush the tops over with egg and milk as for buns.

Tea cakes are made nearly the same, the difference being that they are rolled out flatter, and are not put into hoops. These do not require quite so much proof as the Sally Luns.

Milk Rolls, or Queen's Breakfast Rolls.—One pint of milk, five or six eggs.

Or, one pint of milk, one-half pint of eggs, a little salt, six ounces of butter, and three-fourths ounce of German yeast.

Set sponge and make into a dough as for buns; when the dough is proved enough, weigh it in pieces of three ounces; mould them round, place them on boards or trays, dusted with flour, about three inches asunder, that they may not touch each other; prove them nicely, but not too much; put six or eight of them on a large biscuit peel, and keep them separate; cut each about half-way through the center with a sharp, thin knife, and bake them in rather a quick oven on the bottom. When done, brush off the flour from the bottoms, and wash over the tops with egg and milk as for buns, or with clarified butter.

JUBILEE BUNS.—Two pounds of flour, three-fourths pound of loaf-sugar, three-fourths pound of butter, four eggs, one-half ounce of carb. of ammonia. Rub the butter in with the flour, make a bay and add the sugar; pound the ammonia in a little milk, and pour in; break the eggs, and mix altogether into a dough. Make six buns out of a pound of dough; mould them round; wash the top with egg, put a small piece of peel in the center, dip the tops in rough sugar, and put them on a buttered tin so as not to touch. Bake in a moderate oven on two or three tins. No yeast.

RICE BUNS.—Two pounds sifted flour, one pound powdered loaf-sugar, twelve ounces ground rice, eight ounces butter, five eggs, twelve ounces currants, two and one-fourth ounces carb. ammonia, and a bare one-half pint of water or milk. No yeast.

No. 2.—Six pounds of flour, three and one-half pounds of loaf-sugar, two pounds of ground rice, one and one-half ounce carb. ammonia, two pounds of eggs, and one-half pint of milk. No yeast.

Mix the ground rice, flour and sifted sugar together; rub in the butter; pound the carb. ammonia in a mortar, using ammonia gradually, so as to dissolve it. Make a bay with the flour, add the eggs and milk, and make into a paste. A little essence of lemon may be added to the mixture. With the second mixture I prefer using two or two and one-half

ounces ammonia instead of one and one-half ounces, as it makes a more free and a better-looking cake.

Eight or nine two-cent buns should be made out of each pound of dough. Mould them round; put them on buttered tins about three inches apart, as they will spread considerably in baking; flatten them a little with the hand. Wash the tops with egg and a little milk mixed, and bake them in a sound oven. Set something, as a brick, or tin dish, bottom upward, under the tins, when they are put into the oven, or they will have too much bottom by the time they are baked.

Belgian Buns.—Three pounds of flour, one pound and two ounces of butter, one pound and ten ounces or powered loaf-sugar, twelve ounces of blanched sweet almonds cut in fillets, eight ounces preserved citron, or lemon and orange peel, cut small, the yellow rind of two lemons, grated, seven eggs, one-fourth ounce of cloves, one-fourth ounce of ground ginger, one-half ounce of nutmegs, one ounce of carb. ammonia, one pound of washed and picked currants. Mix, and proceed in every respect as directed for rice buns, reserving a few pieces of the almonds to put on the top of each. Twelve buns are usually made out of a pound of dough.

Rich Seed School Cake.—One quart of milk, three eggs, one and one-half pounds of butter, one pound of yellow sugar, one and one-half or two ounces of seeds, two ounces German yeast, or its equivalent, and flour sufficient to make a dough.

Mix and ferment as for buns, make it into a soft dough; when it is ready, divide it into six-cent, twelve-cent, or twenty-five-cent cakes, at the rate of twenty to twenty-five cents per pound; put them into round-cake tins, with bottoms suited to the different sizes, and let them be buttered; prove them, but not too much, and bake in a slow oven.

Rich Currant School Cake and Common Twelfth Cake.—One quart of milk, three eggs, two pounds

of butter, three-fourths pound of sugar, six pounds of currants, and a little mixed spice, two ounces yeast, and flour sufficient to make a dough.

Make as the last, and weigh it at the rate of twenty-five cents per pound; prove and bake as the last; you may know when they are done by pushing a small piece of round stick into the middle of the cake—if it comes out dry, they are done. Six-cent and twelve-cent cakes will take about half an hour baking. The more common lunch cakes are made from the same mixture as buns.

Bun Cake.—Four pounds of flour, one pound of currants, one pound of raisins, stoned, or Sultana raisins, twelve ounces of butter, eight ounces of sugar, eight ounces of preserved lemon and orange peel, a little nutmeg and mace. Make a sponge with part of the flour, warm milk and yeast first, and proceed as directed for plain buns. Use enough milk to make a dough.

Rich School Dough Cake.—To four and one-half pounds of light roll dough, mix in one and one-half pounds of butter, eight ounces of sugar, one and one-half pounds of currants, eight ounces of preserved peel cut small, and three eggs. Make into cakes, prove, and bake in a slow oven. When baked, sift loaf-sugar on the top of each.

Buttermilk and Cream Cakes.—Two pounds of flour, a tablespoonful and a half of good table beer yeast, or one-half ounce of German yeast, and set sponge with one-half pint of warm buttermilk. When the sponge is ready, add a teacupful of cream, or a little butter, and sufficient warm buttermilk to make a dough, in which one-fourth ounce of carbonate of soda has been dissolved; add also twelve ounces of currants; make the whole into a dough; when sufficiently light make into cakes of any size, prove, and bake them in a good oven.

Dough Cake (another way), Seed or Currant.—Four pounds of roll dough, one pound of butter,

one pound of sugar, one pound of Sultana raisins, one pound of currants, one-half pound of preserved orange and lemon peel, cut small, the yelks of six eggs, and a few caraway seeds. Mix well together, make into cakes of any size, and put into buttered hoops; prove well, prick in the center with a bit of whisk to prevent blistering; bake in a cool oven.

Tops and Bottoms.—Four pounds of flour, six ounces of butter, four ounces of loaf-sugar, one quart milk, two ounces German yeast, or its equivalent; or use the same mixture as for Sally Luns.

Set sponge and mix as for plain buns; when the dough is ready, break eight pieces out of eleven ounces of it, mould them round, and place them in straight rows on buttered tins, nearly touching each other, prove them well, and bake in moderate oven. When they are cold, or the day after they are baked, first cut down each row with a sharp knife, then cut out each separately and as evenly as possible; finally, lay them on their sides, and cut them in halves. Put them on clean tins nearly touching each other, with the cut sides upwards; place them in a moderate oven, and when nicely browned they are done. If the oven be too hot, leave open the oven door, or else they will color too quickly without being dried; or, when sufficiently colored, they may be dried in the stove.

Rusks.—Take the same mixture as that for Sally Luns, or the last recipe; weigh it in pieces of one pound, one pound and a half, or two pounds, each; and mould into long, even rolls five or six inches in circumference; let them be quite straight, and the ends square. Place them on buttered tins so that they may not touch each other; flatten them a little with your hand, and prove them; when they are near proof, prick them several times along the top with a fork or small piece of wire, which will prevent the top crust or rind coming off; bake them in a moderate oven; when they are a day or two old,

cut them crossway into thin slices with a sharp knife, lay them on clean tins close to each other, put them in a brisk oven; when nicely colored on the sides uppermost, take them out and turn them on the other side, put them in again, and when colored they are done.

Strasburg or Presburg Zweiback.—Prepare some long loaves as for rusks out of the mixture for plain buns, without any spice it; make the dough rather tighter and the loaves smaller, so that they may be nearly three inches wide when baked. Do not prove too much, but let them be rather under than over proof; when baked, cut them in slices about an inch thick, and each slice again in two pieces; these should be browned, as the other rusks, after they are divided. Then blanch equal parts of sweet and bitter almonds, dry them in a gentle heat; pound in a mortar with the same weight of loaf-sugar as almonds, and sift through a coarse sieve; what does not pass through, pound as before or grind in an almond mill rather coarsely set; mix the sugar and almonds into a moderately thin paste, with either whole eggs or part yelks of eggs; spread this over the top and sides of each piece with a knife, so as to give them a thin coating; the mixture must not be too thin, or it will run off the rusks after they are spread; place them on clean tins in rows about two inches apart, but nearly touching at the ends. Bake in a cool oven until the almond paste is done, then put them in the stove and dry well.

Dutch Rusks.—One quart milk, half pound butter, four or six ounces of sugar, four or six eggs, and yeast.

Set sponge and make into a dough as the others; when it is ready, mould them up into small round balls about the same size as for halfpenny buns, and put them on buttered tins so as not to touch; prove, bake in a brisk heat; when cold, cut in halves, and finish as tops and bottoms.

German Buns.—The same mixture is used as the last (rusks). These are made oval, and when nearly proved are put in a cold place to set. They are then cut down the middle with a sharp knife, and baked in a warm oven; when they open in the center the same as milk rolls.

Biscottes de Bruxelles.—Make rusks from the dough for milk rolls, adding about four ounces of loaf-sugar to the mixture, or from the dough for Dutch rusks; make dough a little "tighter," so that they may rise rounder on top; these must not be made quite so large as the last; prove, bake, cut in thin slices, color as the others, but of a pale brown.

Scotch Buns.—Five pounds washed and picked currants, or two pounds stoned raisins, three pounds currants, twelve ounces butter, one pound blanched almonds (some may be cut in small pieces) one pound candied peel. Mix well together with two and one-quarter pounds plain bun dough, or the same quantity of bread dough, and four ounces of yellow sugar; add a little ground ginger, allspice and cinnamon to make the whole a nice flavor.

Take some of the same paste as for butter biscuits, or mix eight ounces of butter in with four and one-half pounds bread dough; roll it out into a thin, flat, round sheet, in a similar manner as you would for a captain's biscuit, only rather larger; then take of the above mixture about a dessert or or small tablespoonful, and put in the center, fold the paste round it, when it will form a ball, or nearly so, flatten it a little, and cut round the sides with a knife, afterwards mark the top with a docker, the same as used for seed biscuits, pressing on it so as to open the cuts round the side, and make the bun flatter or broader over the top, then place them on tins, which may be slightly buttered; put them so as not to touch each other, brush the tops over with egg, or egg mixed with part milk, and bake them in a moderate oven.

AMERICAN METHOD.—The American plan of making both buns and rusks varies somewhat, and yet gives probably equally good results.

Buns.—Rub one-half a pound of butter in enough flour to take it up; add three to four eggs, a pound of sugar, a quart of milk and a teaspoonful of salt; mix well, and add four quarts of ordinary bread sponge; add sufficient flour to make the dough, and knead them well; make them up into shape; prove ten minutes or more, and bake in a moderate oven.

Rusks.—The same method as for buns, only altering the shape.

Rolls.—Bread sponge, four quarts; milk, one and one-half pints; butter, four ounces; sugar, two teaspoonfuls. Mix, add sufficient flour to make a rather firm dough, cut and scale. Bake in moderate oven.

XXVI.—POUND CAKE MIXTURES.

PREPARATIONS FOR MAKING.

When a mixture of pound or sponge cakes is to be made, first get everything ready that is required. The butter, if salt, to be washed, and well worked to get out the water, weighed and put into the pan to warm (if in winter), but not melted. The sugar pounded, sifted and weighed; eggs broken separately into a cup, and each tried by smelling; if good, put them together into a pot or basin; peel cut; currants washed clean, picked and weighed; flour weighed and sifted; carbonate of ammonia weighed, pounded, etc. Most of these things should be placed separately on pieces of clean paper or in pans; the flour, currants, spice and peel may be mixed together.

In winter, the basin containing the eggs should be placed in hot water to warm, otherwise the mixture may get cold and be heavy; the curaants, peel and flour may be warmed in the proving oven, while the sugar, butter and eggs are being mixed.

Cakes that are required to be iced, should be baked in hoops with straight sides, and be papered evenly; it will be found very inconvenient to put on the icing if the cake slopes in towards the bottom, and nearly so if not quite round, or if larger at the bottom than the top.

Large cakes should also be baked on two plates or baking sheets, with sawdust or fine ashes, half an inch deep, covering the bottom one, and if the cakes are very large, a tin or stiff paper tube, buttered, should be put in the center to facilitate the baking.

Before cutting an iced cake, first cut the icing with a small sharp knife; the large knife required to divide the cake will crack and break the icing.

Eggs are usually reckoned at 8 to the pound; each egg, if of moderate size, will weigh about two ounces; very large ones will of course weigh more, and small ones less than two ounces, according to the size. A pint of eggs will weigh a pound and a quarter. The shells from a pound of eggs will average about two ounces, leaving fourteen ounces of eggs when they are broken, therefore it will take nine good sized eggs to make a pound when deprived of their shells.

Common Pound Cakes.—1 lb. of butter, 1 lb. of sugar, 1 lb. of eggs, $1\frac{3}{4}$ lb. of flour, $\frac{1}{2}$ a teacupful of milk, $\frac{1}{2}$ oz. carbonate of ammonia. Or,

$1\frac{1}{4}$ lb. of butter, $1\frac{1}{4}$ lb. of loaf sugar, 1 pint of eggs, $\frac{3}{4}$ oz. of carb. ammonia, a teacupful of milk, or $\frac{1}{3}$ pint, and 3 lbs. of flour; some use 1 oz. of ammonia.

Have a very smooth glazed earthen pan, make it about blood warm, and cream the butter (to cream the butter crush it with the hand until soft and uniform. A palette knife, such as painters use, is handy. The butter should never be melted into it.) Stir in the sugar, and continue to work it until it is smooth and appears white, then stir in the eggs gradually; before they are all in, add a part of the flour, and mix it with the remaining portion of the eggs well together; then pour in the ammonia, which should be previously pounded

and dissolved in the milk; mix this well, and afterwards the other part of the flour lightly. Have the small round or heart pans buttered, half or three parts fill them, put a few currants on the top, and bake them in rather a quick oven.

Another Method, more common.—1 pint of eggs, 1 lb. of loaf sugar, 6 oz. of butter, 2 lbs. of flour, ½ oz. ammonia.

Cream the butter in a pan as before, beat the eggs and sugar well together, add the ammonia in a fine powder, stir these in with the butter, add the flour, and mix the whole together with a spoon; fill the pans, and put a few currants on the top as before. It is usual to try a few of these first, to see if they break sufficient in the center, and rise with a white top; if they do not, the mixture is too rich, when a little more flour should be added, or a little more flour with an egg, or some milk, and be well stirred in.

Another.—3 lbs. of butter, 3¼ lbs. of yellow sugar, 6¾ lbs. of flour, ¾ of a pint of water, 1½ pint of eggs, 3 oz. ammonia.

This mixture improves by being kept in a warm place for an hour or two after it is made up, before filling the pans.

Pound Cake No. 4.—3 lbs. butter, 4 lbs. granulated sugar, 40 eggs, 4 lbs. flour, 20 drops essence of lemon.

Cream the butter and sugar with the hand or large palette knife until light; then add the eggs four or five at a time, and beat light; when half the eggs are in, add the essence of lemon; then finish with the eggs—still four or five at a time, more makes it difficult and likely not to produce so good a result; when all the eggs are in, add the flour, previously sifted; when well mixed pour into cake moulds or hoops. The moulds now used are provided with tubes in the center, which allow the cake to bake from the center as well as from the outside. If you bake in a hoop, put a cylinder of stiff writing paper, oiled, in the

middle *before* pouring; this will answer the same purpose as the tube in the punctured moulds. The hoops should be lined on sides and bottom with buttered or oiled paper before being filled. The baking heat should be less than that for bread by fifteen to twenty degrees. Leave in moulds or hoops to cool. If inexperienced in baking, after 20 minutes, insert a piece of broom-corn into the cake; if this comes out without adhering dough, it is done. If the top brown too fast, cover with a sheet of paper.

Some bakers and many housewives use *baking powder* to aid in making their pound cake. Baking powder is a compound, when pure, of the bi-carbonate of soda and bi-tartrate of potash (cream of tartar). It is probably more wholesome than soda alone; at any rate, it does not give the soapy taste which soda does, as the cream of tartar and soda in combining neutralize each other, making the tartrate of soda and potash, which, in the small quantity used in baking, is not harmful, while the soda alone is somewhat irritating to the digestive canal. Indeed, in Seidlitz powders, we have the same combination and almost the same proportions as in baking powder. The proper proportions for the baking powder are:

1 part bi-carbonate soda.

2 parts cream of tartar, or in small quantities—3 oz. of carb. soda to 6 oz. cr. tartar.

Every baker can make this powder for himself. The soda can be obtained pure enough of manufacturers, and the tartaric acid should be got in crystals of the manufacturer and powdered, so as to be sure and have it pure. Both ingredients should be powdered and sifted through coarse muslin or a fine sieve. The powder should be thoroughly dried, and it may then be mixed or not with well-dried corn starch or powdered farina. Starch or farina is only added to help to keep the powder, as it aids in separating the particles. If added, one pound to every three of the mixture is enough. This baking powder

is the active ingredient in self-raising flour, to which it is added in the proportion of half an ounce of the powder to every two pounds of flour.

Other baking powders are made containing alum, but no human food should be contaminated with this substance, for there is no doubt but that it contributes directly to kidney diseases and much suffering.

The main use of baking powder in cake work is to save *eggs*. The quantity of eggs may be diminished a quarter if baking powder is used in the proportion of one teaspoonful to every $1\frac{1}{2}$ pints of flour; but the result, though sufficiently light, will lack in richness. However, for many localities it will do well enough, especially if sales are rapid. Cakes made with baking powder get stale sooner than those made without.

Lafayette Cakes.—$\frac{1}{2}$ lb. of butter, $\frac{1}{2}$ lb. of sugar, $\frac{1}{2}$ lb. of flour, 6 eggs, $\frac{1}{4}$ oz. ammonia.

Mix as pound cakes. Bake them in round flat tins about a quarter of an inch deep, or drop some of the paste on white-brown paper, and spread it out into a round thin cake, six inches in diameter; this will make twelve cakes; bake them in a moderate oven on tins; take them off the paper when baked; spread some raspberry or other jam on the surface of two of them, and put three together; trim round the edges with a knife, and divide them into four, six, or eight parts, according to the price they are sold at.

Madeira Cakes or Buns.—1 lb. of flour, 1 lb. of butter, 1 lb. of powdered loaf sugar, 12 eggs, the peel of 3 lemons rubbed off on sugar, or a little essence of lemon, 8 or 12 oz. of citron peel cut small, 1 nutmeg grated, the same quantity of pounded mace and cinnamon, and a glass of brandy.

Mix as other pound cakes, and put the mixture either into small or large round hoops, with paper over the bottom and round the sides; bake them in a moderate oven; allow ten or twelve ounces of this mixture for a 25c. cake.

No. 2.—$1\frac{1}{2}$ lb. of sifted flour, $1\frac{1}{2}$ lb. of powdered

loaf sugar, 1 lb. of good butter, 12 eggs, the rinds of 2 lemons grated on sugar and scraped off, ½ a nutmeg grated.

No. 3.—2 lbs. of butter, 2½ lbs. of sugar, 3 lbs. of flour, 18 eggs, a little pounded mace and cinnamon, and a wineglassfull of rum.

No. 4.—As made at Brighton. 1¼ lb. of butter, 1½ lb. of sugar, 1 lb. 10 oz. of flour, 12 eggs, a little essence of lemon, peel on top.

Mix as the former; twelve ounces of this mixture are allowed for a 25c. cake; put into nicely papered hoops six inches in diameter, spread them out to the sides of the hoops, dust with finely powdered loaf sugar, put some large thin slices of citron peel on the top, and bake them a delicate brown, in a moderately cool oven.

Madeira Drops.—12 oz. of finely powdered loaf, 10 oz. of butter, 1 lb. of flour, 8 eggs, ½ a grated nutmeg, and a little essence of lemon. Mix as the last. Drop them on white-brown paper about the size of a silver dollar, and bake in a moderately quick oven.

Queen Cakes.—1¼ lb. of fine flour, 1 lb. of loaf sugar, ½ lb. of currants, 9 eggs, and a small bit of carb. ammonia. Mix as before directed for pound cake; let the pans be nicely cleaned and buttered, but not too much; fill them, dust the tops with sugar, and bake in a moderately quick oven. These may be made plain by leaving out the currants.

Seed Pound Cake.—1¼ lb. of flour, 1 lb. of fine sugar, 10 eggs, and 1 oz. of caraway seeds. Allow 12 or 14 oz. of this mixture for 25 cent cakes.

Fruit Pound Cake.—The same as the last, adding 1½ lb. of currants instead of the seeds, with a small bit of carb. ammonia. Seedless raisins may be used instead of currants; it is then called Sultana Cake.

Plain Pound Cake.—1 lb. of butter, 1¼ lb. of sugar, 1¼ lb. of flour, 10 eggs, and a small bit of ammonia.

Wedding Cake.—1¼ lb. of flour, 1 lb. 2 oz. of butter, 1 lb. of yellow sugar, 4 lbs. of currants, 1¼ lb. of mixed

peel, 2 nutmegs grated, ½ oz. of ground cinnamon, 10 eggs, ½ lb. of blanched sweet almonds cut in halves or fillets, and a wineglass of brandy. Mix as before directed.

RICH SEED CAKE.—14 eggs, 1 lb. of butter, 1 lb. of powdered loaf sugar, 1¾ lb. of flour, 2 oz. of caraway seeds, ½ lb. of sweet almonds cut in fillets, and ¼ oz. of cinnamon and mace finely pounded with some of the sugar. Mix as other pound cakes, and bake in one large or several small hoops. Bake the large cake in a cool oven, and the smaller ones in a more brisk heat.

RICE POUND CAKE.—1 lb. of butter, 1 lb. of sugar, 10 eggs, 12 oz. of fine flour, 8 oz. of ground rice.

No. 2, very rich.—2 lbs. of butter, 1½ lb. of sugar, 1½ lb. of eggs, 1½ lb. of fine flour, 1 lb. of rice flour, 3 lbs. currants, 1½ lb. preserved peel, 2 nutmegs grated, and a little milk.

Mix as other pound cakes, and bake in the usual way, or in oval tins instead of round ones.

COMMON FRUIT CAKE.—3 lbs. of butter, 2 lbs. of sugar, 24 eggs, 6 lbs. of sifted flour, 4 lbs. of currants, 1½ lb. of preserved peel cut in thin slices, 2 oz. of mixed spice, 1 pint of warm milk, and ½ oz. of ammonia pounded fine and dissolved in the milk. Mix as directed for common pound cakes.

RICH FRUIT CAKE.—1 lb. butter, 1 lb. sugar, 1¼ lbs. eggs, 1 lb. best raisins (use seedless, or take out seeds), 2 lbs. currants, 1 lb. citron, shredded, 2 oz. brandy, ½ oz. each cinnamon, mace, allspice, and cloves.

Cream the butter and sugar; add eggs gradually, then the fruit; mix thoroughly; add the brandy; then put in the flour; mix well; pour into well-greased hoops, or into hoops lined and bottomed with oiled paper; keep in the hoops till cold.

GENOA CAKE.—This is now made in a very different way from what it was when first introduced into this country; it was then composed as follows: To 4 oz. of blanched sweet almonds, finely pounded, add 6 oz. of flour, 8 oz. of finely pounded loaf sugar, 8 oz. of

good butter, 4 eggs, and a spoonful of brandy. These ingredients are to be mixed the same as pound cake. For variety, currants, preserved citron or orange peel, vanilla, or maraschino liqueur may be used to flavor. The following is the modern mode: 1 lb. of butter, 1 lb. of sugar, 1½ lb. of flour, 2½ lbs. of washed and picked currants, 1½ lb. of preserved orange and lemon peel cut small, 1 lb. of eggs. Mix and bake as pound cake.

Citron Genoa Cake.—Use the same proportions as the last, substituting Sultana raisins for the currants, and citron peel for the lemon and orange.

Mix as pound cake; cover a baking sheet, having edges, with paper, so as to form a kind of case; spread the mixture over about an inch, or rather more, in thickness, make it smooth on the top, and strew some blanched and chopped sweet almonds rather thickly over; bake in a moderately heated oven. When cold, cut in twopenny or larger slices. This is usually sold about 40c. per pound.

Nuns' Biscuit.—1 lb. of butter, 2 lbs. of sugar, 12 eggs, 1 lb. 8 oz. of flour, 8 oz. of almonds.

Mix as pound cake, put them in small tins buttered, and bake in a good oven.

Nuns' Biscuit, No. 2.—1 lb. of blanched sweet almonds ground or pounded fine with 2 lbs. of loaf sugar, and passed through a moderately fine wire sieve, 8 oz. of citron peel cut small, the yellow rinds of 4 lemons grated off, 8 oz. of flour, and 12 eggs.

Separate the yelks from the whites and beat the latter to a stiff froth, put the yelks with the sugar and almonds into a pan, and stir well together with a wooden spoon, until it appears rather white and light, then stir in the whites, and afterwards the flour, and peel very lightly, so that the whole may be perfectly mixed. Have ready buttered some oval, round or other shaped small pans, similar to Queen's cake pans, but rather deeper; three parts fill them with the mixture, dust the tops with powdered loaf sugar, and bake in a

moderately heated oven, the same heat as for sponge cakes. For variety, about 4 or 6 oz. of the almonds may be cut into fillets and added with the peel, instead of the whole being pounded fine.

Citron Pound Cake.—$1\frac{1}{4}$ lb. of butter, 1 lb. 2 oz. of sugar, $1\frac{1}{4}$ lb. of flour, 6 eggs, and 4 yelks of eggs, 8 oz. of preserved citron, and a wineglass of brandy.

Mix in the usual way, and make into square cakes of any size. Cut the citron into long thin pieces, and put two or three layers in each cake. Dust the tops with powdered sugar, and bake in a moderate oven. These will be found very nice, rich cakes.

Citron Heart Cakes.—1 lb. of butter, 1 lb. of sugar, 1 lb. 2 oz. of flour, 4 oz. of citron peel cut small. Mix as pound cakes, and bake in round heart tins, dusting the tops with sugar before they are put into the oven.

Orange and Lemon Heart Cakes can be made in the same way, using the preserved peel of either instead of the citron.

A Plum Cake (unfermented).—$1\frac{1}{2}$ lb. of powdered loaf sugar, 8 oz. of raisins, stoned and minced, or use Sultana raisins instead, 8 oz. of currants, 8 oz. of blanched sweet almonds cut in fillets, 12 oz. of butter, 2 lbs. of flour, and nearly $\frac{1}{2}$ pint of milk, $\frac{1}{2}$ oz. of mixed spice, $\frac{1}{2}$ oz. of carbonate of soda, and 3 drams of hydrochloric (muriatic) acid.

Mix as pound cake, bake in papered hoops, smooth the top of each cake, and strew over caraway comfits. Large cakes will require to be baked in a cool oven; smaller ones in a brisker heat.

The carbonate of soda should be dissolved in the milk, and the acid added to a little water or a portion of the milk; or the soda may be mixed with the sugar, and the acid with the milk, which should be added at the same time with the flour. See common pound cakes.

Penny Pound Cakes.—1 lb. of butter, 1 lb. of loaf sugar, $1\frac{1}{2}$ lb. of flour, 9 eggs, $\frac{1}{4}$ pint of milk, $\frac{3}{4}$ oz. of carbonate of soda, 6 drams of muriatic acid.

Mix as common pound cakes, and bake in round

buttered tins, put a few currants on the top, and bake in a moderately brisk oven.

The soda may be added with the sugar, or it may be dissolved in one portion of the milk, and the acid in the other; then, after the butter, sugar and eggs are well mixed, stir in either the soda or acid with a portion of the flour, and then the other with the remaining portion.

These cakes I found would rise much better, and break with a "nice white head," by the mixture remaining, when finished, from one to two hours in the pan, in a warm place. The cakes, made this way, eat and keep much better than when made with ammonia, but they do not look so large.

Scotch or Dundee Seed Cakes.—1¼ lb. of butter, 1¼ lb. of sugar, 2 lbs. of flour, 18 eggs, 2½ lbs. of orange or citron peel, ¼ lb. of blanched almonds, 5 oz. of caraway seeds.

Make as Madeira cakes, and strew some very large Scotch caraways over the top.

Silver Cake.—1 lb. butter, 1 lb. sugar, 1½ eggs *Whites*, 1½ lbs flour, 4 oz. bleached almonds beaten in the mortar, or 3 *drops* almond flavoring.

Mix as before; bake in hoops lined with oiled paper, and in a moderate heat.

XXVII.—SPONGE MIXTURES.

Sponge Cakes (Hot mixtures).—1 lb. of powdered loaf sugar, 12 oz. of flour. Or,

1 lb. 2 oz. of eggs, 1 lb. of sugar, 14 oz. of flour.

Provide a clean, smooth, glazed earthen pan, or a round bottom copper pan, place the first in the oven to warm, with the sugar in it; when warm enough, which will be in about five or ten minutes, according to the heat of the oven, break in the eggs, and whisk them well with a birch or iron wire whisk; or it may be

heated in the copper pan over a fire, or in the earthen pan by placing it in a pail of hot water. By each way, the end required is to heat the mixture until it is blood-hot. As soon as it has attained this heat, remove it, and continue whisking it until cold, when it should be light, white and stiff, the surface appearing full of air-bubbles; if it should not come up very well, heat it again as before and whisk it till cold. A half egg-shellfull of hot water may be added with advantage to each pound of mixture, when it is about half up, which will often save the trouble of its being heated again, and more cakes may then be made out of it. When it is finished, take out the whisk, sift the flour, and stir it in lightly with a spoon or spatula. In large mixtures I prefer using my hand for this purpose, as I find that it can be mixed in much lighter and more evenly. This cannot be accomplished so perfectly with a spoon, without stirring the mixture too much, which will make it rather heavy.

Have some pans or frames nicely and evenly buttered; most persons prefer that the frames should be well dusted with fine powdered sugar, or sugar and flour, after they are buttered, which gives them a smooth surface. Put a spoonful in each pan; dust the top with sugar, and bake them in a moderate oven. This mixture should produce four dozen of 2-cent sponge cakes.

In making Savoy or other large cakes, the "scraping of the pan," that is, that part of the mixture which adheres to the side of the pan after the bulk has been taken out, should not be used, as it forms a hard core in the cake, neither does it soak or bake well. Savoy biscuits, and all other sorts of drops which contain it, crack or open on the top, instead of remaining with a whole smooth surface; there is no loss attached to its not being used, as it will serve to enrich buns or other things of a similar nature. Those made by the above directions are termed hot mixtures; but they do not keep so well as those made cold. At the end of a

week those done without heat will be quite moist, whilst the others will be dry and stale; yet those made hot have an advantage over the others, as more biscuits or cakes may be made from it, provided it is properly beat.

Cold Mixtures are made by carefully separating the yelks of the eggs from the whites; put the latter into a clean pan, and whip them to a strong froth, so as it will bear an egg; then stir in the yelks, afterwards the sugar gradually, and continue whisking until the whole is well mixed; lastly, stir in the flour very lightly. It will be necessary to observe that everything used about these mixtures must be perfectly free from grease.

SAVOY CAKES.—Make as sponge cakes.

ALMOND SAVOY CAKES.—8 oz. of blanched and dried sweet almonds, 4 oz. of blanched bitter almonds, 12 oz. of pounded loaf sugar, 8 oz. of flour, ½ pint of whole eggs, and 1 pint of yelk of eggs; 1 lb. of sugar may be preferred by some to 12 oz.

Pound the sugar and almonds together, and pass them through a moderately fine wire sieve, put these into a mortar or pan, add the yelks, and mix well until it appears white, then add the whole eggs, and continue mixing as before; or it may be done as sponge cakes. When the mixture is quite light, stir in the flour lightly. Have the moulds ready cleaned and buttered, dust them with flour, and three parts fill them. Tie buttered paper round the edge of the moulds, and bake in a moderate oven.

ALMOND HEART CAKES may be made the same, using deeper pans than ordinary. Those used by confectioners for this purpose have no bottoms; a level plate is covered with paper, and the buttered tins put on it filled and baked.

LADY'S FINGERS OR SAVOY BISCUITS.—1 lb. of eggs, 1 lb. of sugar, 1 lb. of flour; flavor it with essence of lemon.

Mix and prepare as for sponge cakes (cold mixtures);

have a regular biscuit forcer or small pipe or funnel attached to a bag made either of bed-ticking or a bullock's bladder, half or three parts fill this, and lay them off in lengths, about three inches long, on white-brown paper ; sift some fine powdered loaf sugar over them, so that the tops may be covered with it ; take the paper by the two corners, and shake off all that does not adhere to the biscuits ; this is termed icing them ; place them on a clean tin, and bake them in a moderately warm oven. Some of the mixture may be also made into round drops. When they are baked, wet the back of the paper, take off the biscuits, and put the bottoms of two together. There are moulds sold especially for making Ladies' Fingers.

Italian Tea Biscuits.—Take the same mixture as for Savoy biscuits, make them in round drops with the bag and funnel, on white-brown paper ; vary them by putting on the tops of some a few currants, on others a few blanched sweet almonds chopped small, a little citron or lemon peel cut small, or a few caraway seeds ; dust the tops with sugar, and bake them in a moderate oven. When baked, wet the paper, take them off, and put the bottoms of two together.

About two hundred years since, the proportions for these cakes were : 1 lb. of sugar, 1 lb. of flour, 6 eggs, and ½ oz. of aniseeds in powder, dropped round on buttered tins, the tops being quite plain.

Tea Drops.—As the last ; make them about the size of a five-shilling piece, and dust the tops lightly with sugar, that the surfaces may appear cracked ; take them off the paper, and keep them separate.

Fruit Biscuits.—6 whole eggs, 6 yelks of eggs, 1 lb. of sugar, 1 lb. of flour.

Mix as sponges ; drop them on paper about the size of a quarter, dust the tops with sugar, bake them as the others ; take them off the paper, spread some preserved fruit or jam over the bottom, and put two together. These may afterwards be iced, and colored to represent peaches, etc.

Judges' Biscuits.—10 eggs, 1 lb. of sugar, 1 lb. of flour, and a few caraway seeds. Or,

8 eggs, 4 yelks, 1 lb. of flour, 1 lb. of sugar, and a few seeds.

Make as for sponges; drop them on paper, the same size as tea drops, dust the surfaces well with sugar, and bake as the others; take them off the paper; they may be kept separately or put together.

French Savoy Biscuits.—Take the second mixture for Judges' Biscuits, and make them as directed for Savoy biscuits.

Italian Cakes.—Take the same mixture as for Judges' Biscuits, leaving out the seeds, and flavor it with essence of lemon; have a tin or wooden ring with a handle to it; let it be three inches wide, and the eighth of an inch thick; place a sheet of paper on a clean tin, put the ring on it, and fill it with the batter, smoothing over the surface with a knife; put the knife underneath the edge, and remove the ring; lay off as many as you can on the paper, without touching each other, bake them in a hot oven; when they are baked, wet the back of the paper, take them off, and put two together. Dry them in a stove or cool oven; when dried, they should be kept in a dry place; and they will keep good for some months.

Rolled Jelly Cake, Roll Sandwich, or Swiss Pudding.—16 eggs, 12 oz. of sugar, 12 oz. of flour. Or,

16 eggs, 14 oz. of sugar, 12 oz. of flour, 1 oz. of butter chopped very small in the flour, 2 oz. of bitter almonds, ground.

Mix as for sponge cakes, observing to whisk the eggs and sugar well together, that the mixture may be of a good thickness or consistence before the flour is added, which should be stirred in lightly.

Lay two pieces of white writing paper, seven or eight inches wide, and about two feet long, on two clean baking sheets (tins). Pour the mixture from the pan the whole length of the paper on each tin; spread it a little with a knife, so as the batter may be nearly

half an inch in thickness, and to make the edges straight.

Bake them in a moderately warm oven, observing that they should be done enough, but *not too much*, or they cannot be well rolled.

Have ready prepared, by the time they are baked, some raspberry jam and currant jelly in separate basins, "thinned" with a little water, being careful that it is not too much so, or it will soak through the cakes and spoil their appearance.

As soon as the cakes are baked, turn them over on a clean *dry* board or paper; take off the paper they were baked on, spread jelly over one of the cakes, and jam over the other, and roll them up. When rolled, brush over the top of each cake lightly with a brush dipped in clean water, so as just to moisten the surface, and roll them, as they are done, in some coarse grains of loaf sugar. Cut them in slices according to the price they are to be sold at.

A single cake made as above, covered with jelly, and rolled up, is more convenient generally.

French Jelly Cake.—A pound of butter, pound of sugar, worked to a cream. Add the yelks of 15 eggs, and beat up light, and beat the whites of the eggs up stiff. Add one pound of sponge cake crumbs to the sugar and butter, and beat up. Then add one pound of corn starch and the whites of the eggs gradually until it is worked even, smooth and stiff. This is the filling. The crust is good pie-bottom crust, as short as you please. Line the bottom of an oblong pan with it, spread over it a little good jelly, and on top of this the *filling* to the depth of half an inch. Bake in moderate heat, ice lightly, and cut into blocks.

Mountain Cake, or White Mountain Cake.—½ lb. sugar, ¼ lb. butter, ½ lb. whites of eggs, ½ lb. flour, ½ teaspoonful cr. tartar, ¼ soda, or ¾ baking powder.

Or ½ lb. sugar, 6 oz. butter, 4 eggs, ½ gill milk, 10 oz. flour, cr. tartar and soda or baking powder as above.

Dissolve soda, if used, in a little milk.

Work the butter and sugar together; then the eggs, and milk; then the flour, with baking powder or cr. tartar mixed with it. Make three circular cakes of this, of equal size. Bake lightly. When done, put some nice cocoanut icing on top of each, a full quarter of an inch thick. Lay them on top of each other, and pour some good vanilla-flavored icing slowly over the *whole.* Bake lightly a few minutes. The outer icing may be made with cocoanut if desired. See Icing.

Flat Jelly Cake.—Make the cake as in White Mountain cake, using carbonate of ammonia instead of soda and cream tartar. Make 3 or 4 cakes, and put jelly on top of each, except the upper one. No icing.

Scarborough Water Cakes.—8 eggs, 1 lb. of sugar, 1 lb. of flour, and sufficient ground cinnamon to flavor it.

Mix as sponges; lay them off with a ring, the same size as Italian cakes, dust the tops with sugar, and bake them in a moderately quick oven; put two together, or they may be kept single; these are not to be dried.

Biscuit Drops.—2 lbs. of sugar, 6 eggs, 8 yelks of eggs, 2 lbs. of flour, ½ pint of water (originally Canary or Lisbon wine was used instead of water), and a few seeds.

1 lb. of sugar, 1 lb. 2 oz. of flour, 6 eggs, ½ a teacupfull of hot water, and a few seeds.

Mix the sugar, eggs, yelks, and water together, and make as sponges; drop this mixture on wafer paper in drops about as big as a quarter; dust the tops with sugar, and bake them in a moderately warm oven.

Another way.—7 eggs, 1 lb. of loaf sugar, 1 lb. 2 oz. of fine flour, and a few caraway seeds. Heat this mixture twice during the beating, and then proceed as before.

Naples Biscuits.—1 lb. of sugar, 1 lb. of eggs, 1 lb. of flour (originally two table-spoonfuls of rose-water

and a few caraway seeds were added), and half a teacupful of warm water.

Mix as sponges; paper some small long narrow tins with white paper, put in a spoonful of the mixture, ice the tops, and bake them in a moderate oven.

Diet Bread Cakes.—These are similar to the last, but baked in larger tins for sixpenny and shilling cakes.

Leamington, Victoria, or Albert Cakes.—Sponge cake mixture baked in narrow oval tins holding about ¼ lb. of batter each. The tins are to be well buttered; the bottom and sides strewed thickly with currants, and four or five pieces of citron peel placed on the top of each cake; then dusted with loaf sugar, and baked in a moderately heated oven, the same as for sponge cakes.

Rice Cakes.—As sponge cakes, using part ground rice instead of flour. Bake them in small square tins for sixpenny and other size cakes. The pans should be previously carefully buttered, and dusted with finely powdered sugar and flour.

Or, take the weight of 8 eggs of powdered loaf sugar, the weight of 2 eggs of wheat flour, and 6 eggs of rice flour, and proceed as just described, using 8 eggs with the other ingredients.

Arrowroot Cakes.—As rice cakes, using arrowroot instead of ground rice.

Common Sponge Drops (usually sold in the streets and at fairs).—1 pint of eggs, 1 lb. of yellow sugar, or pint of molasses, 2 lbs. of flour, ½ oz. of ammonia.

Mix the eggs and sugar together, as for sponges, add the salt finely powdered; this will not get thick and white like the other mixtures, as the volatile salt prevents it; stir in the flour, drop them on buttered tins, put a few currants on the top, and bake them in a moderately warm oven; take them off the tins with a knife.

XXVIII.—MISCELLANEOUS CAKES.

Cream Puffs.—We will first describe the *Filling.*

Cream or filling: Mix and beat 1 lb. of white sugar, 1 lb. of eggs, ¼ lb. corn starch, and a heaped teaspoonful of salt. In the meantime bring ½ a gallon of milk to a boil. Pour in the other ingredients. Move off the fire and stir until cool. Flavor with vanilla. When quite cold, cut open the puffs, made as explained below, insert a dessert spoonful of the "cream," and bring the edges of the puff together again. A variation of this cream can be made by using only ½ the whole eggs given above, and finishing by beating in 1 lb. of egg whites. This makes a lighter colored filling.

The Puffs: In ½ a gal. of water boil 1¾ lb. of lard, in a shallow vessel, until it froths. If the lard is adulterated with alum, as is the case with much of the canned lard, you are apt to have a failure at this point. Be sure to have good leaf lard, clear of all foreign mixture. When the lard is thoroughly melted, add quickly 3¾ lbs. of sifted flour, a handful at a time, stirring it well; allow to cool and then add 2 lbs. eggs (twenty or twenty-two), a few at a time, stirring well, and finally add ½ an ounce carbonate of ammonia (previously dissolved in very little water). Stir again thoroughly, and then drop on a greased or floured baking sheet, with a tablespoon—each spoonful at a distance of two or three inches from the other, to allow the puffs room to swell. Bake in a moderate oven, and when they are cool fill as described in the preceding paragraph.

Cream Cakes.—1 lb. butter, 1 qt. milk, 2 lbs. of eggs, ¾ lb. flour, ½ teaspoonful bi-carb. soda. Warm the milk, put in the butter, stir until melted. Add the flour gradually, and keep stirring until free from lumps. Cool the mixture and gradually add the eggs, stirring all the time. Finally add the bi-carb. soda. Drop on a baking sheet, and bake in a quick heat.

When they are hardened a little, brush over the top with egg to give them a gloss.

Fill as in cream puffs.

ECLAIRS.—These are very popular in New York. They are only *cream puffs* or cakes baked in a mould shaped like a lady's finger-mould, large size, and filled with the same kind of cream or filling, but covered with chocolate prepared as follows: Dissolve ¼ lb. chocolate and ½ lb. white sugar in ½ gill of water, with the aid of heat. Stir until quite smooth, and then pour over the top of the eclairs as they lie close together in a pan. Set the icing a little in a cool oven.

Or if a stronger flavor of chocolate is wanted, dissolve first ½ oz. gum arabic in ½ gill hot water, and also dissolve ½ lb. chocolate in ½ pint of hot water. Stir till smooth, and pour the mixtures together. This makes a quick-setting icing; it looks bright, and tastes strong of the chocolate. It can be cheapened by using more sugar and less chocolate. This icing also allows a handsomer finish to the article than the first named, but is not so good after the second or third day.

SILVER CAKE (Lady Cake — Lady's Wedding Cake).—Cream 1¼ lbs. of butter, and stir into it 1 lb. of sugar. Then add gradually, stirring well all the time, one pint of egg whites; after this, mix in lightly from 1 to 1½ lbs. of sifted flour, and finally flavor with almond-flavoring—two to four drops—or with bitter almonds, blanched and chopped fine, 1 oz. Bake in a very moderate heat. Ice if desired and ornament in center and on edge for wedding cake. This is a handsome and delicious cake. The essential point in making it is to keep it light.

NEW YEARS' CAKE (New York Cookies—Caraway Cake).—This is a popular cake in New York and vicinity during the Christmas and New Year holidays. It is a crisp, dry cake, about half an inch thick, and pricked on top. Properly it is not iced, though a

popular German form of the delicacy is iced in patterns, and the icing further ornamented with jelly.

I. Cream 1 lb. of butter, and work into it ½ lb. of sugar, a pint of milk, and three to three and a half pounds sifted flour, add a full tablespoonful of baking powder or two teaspoonsful of cream tartar and one teaspoonful of bi-carbonate of soda, and two tablespoonsful of caraway seeds. Lay out in pieces about 2½ in. wide and 5 in. long, crimp the edges and prick the top. Bake in rather a quick heat, and keep in a dry place.

II. Cream 1 lb. butter and 1¾ sugar, and add one pint milk or buttermilk, and two tablespoonsful of saleratus. Add 3 beaten eggs, mix well, add tablespoonful caraway seed and one grated nutmeg. Then mix in flour enough to make a stiff dough. Roll out ⅓ in. thick, cut into shape, and bake in a quick heat.

III. (By measure.) Cream ½ pint of butter into 2 pints of sugar, add ½ oz. caraway seeds, teaspoonful of essence lemon, mix in 2 quarts sifted flour, and teaspoonful carbonate of ammonia dissolved in hot water. Make a stiff dough, roll out and bake as before.

XXIX.—CRULLERS.

No. 1.—10 lbs. flour, 2 lbs. sugar, 2 lbs. eggs, ¾ lb. butter, ½ gal. milk, 3 oz. baking powder (or 2 teaspoonsful of bi-carbonate soda and four teaspoonsful of cream of tartar).

Flavor slightly with lemon; cream the butter and sugar and flavoring; dissolve the soda, if used, in the milk, and mix the cream of tartar with the flour; then mix in the flour with the rest of the ingredients; put in a little more flour; make a stiff paste, roll out and cut with a cruller cutter. If you have no cruller cutter, and have any two round cutters, one smaller than the other, you can first cut a round shape and then cut

out the center with the smaller cutter; this, twisted, gives the shape. If baking powder alone is used it is mixed with the flour. Fry to a golden brown in clean boiling fat; take care the fat is not burnt.

No. 2.—10 lbs. flour, 4 lbs. sugar, 1 lb. butter, 1 lb. eggs, Gallon of milk, 2 oz. carbonate of ammonia, 2 oz. bi-carbonate of soda dissolved in the milk.

Mix and fry as before.

This makes a sweeter and shorter cruller than the first recipe, and is also more expensive. The proportions of butter and sugar in crullers admit of plentiful variation, and the product varies from the leathery productions common around the docks of New York to the crisp productions of Purssell. The thing is to find the golden mean between toughness and excessive shortness or tendency to crumble.

STRAWBERRY SHORT CAKE.

This popular delicacy is found made in several different ways in different parts of the country. We will give the principal ones:

No. 1.—Make a plain sponge cake mixture (see sponge cake) without flavoring, and bake in round cakes, about six inches in diameter. Bake in moderate oven. Take one and cover with a single layer of strawberries, upon which lay another cake, another layer of berries, and finish by putting on the top a little of light *icing* made by beating up the whites of two eggs with five to six ounces sugar (powdered) to make the icing. Put into a cool oven or a warm spot near it, or into a proving dish a few minutes to set the icing.

No. 2.—Is the same as No. 1, with the exception of the icing. To many persons the sponge cake foundation is sufficiently sweet, without the addition of the icing.

No. 3.—A bottom cake of puff-paste (which see) or good pie crust, a layer of strawberries, a top cake of sponge cake, a final layer of strawberries, and icing or not, as in Nos. 1 and 2. Popular in parts of the West.

No. 4.—Sift into one pound of flour one ounce baking powder and a half pound of sugar; then work into it a quarter pound of butter, six eggs and four spoonfuls of cream. Bake in round shape, and arrange with strawberries and icing as in Nos. 1 or 2. Popular in the South.

ICING.

The icing in ordinary use with bakers consists of sugar, white of eggs and a little flavoring. The less sugar the softer it is. To make it well take for every pound of *powdered* sugar, the whites of four eggs, and one teaspoonful of flavoring extract, or one gill of the juice of the fruit. Have the eggs in a long, wide, shallow and cool dish. Throw a handful of the sugar upon the eggs, and with a long, even and continuous sweep, work the two together. Keep adding sugar in the same way, and occasionally some of the flavoring, until all is mixed and the mass is smooth, fine and firm; half an hour is generally enough. Putting the dish on ice aids the operation in summer. If it continues too thin in spite of beating and ice, add more sugar. Icing may be mixed with cocoanut grated, or with chocolate in almost any proportion; and it may be colored with any of the colors confectioners use. But in general it is used white and only flavored with a little lemon.

CHARLOTTE RUSSE.

This is composed of an outside or cake part of *sponge cake*, about one-third of an inch thick (see sponge cake). Ladies fingers are often used for making them. Though the competition has grown so con-

siderable in large cities, that small, plain shapes of cake are used to save labor in the manufacture. Very good but small charlottes may be had in New York for 50 cents per dozen, retail. These are made in small cylinders of writing paper with pasteboard bottoms, and sold in them, the cheapness of the boxes making it not worth while to return them. The sponge cake being ready, the bottoms and sides of the charlotte are cut out with tin cutters, so that the boxes can be rapidly lined with the cake.

The interior or filling of the charlotte russe is made by putting a quarter of a pound of the best gelatine or isinglass into half a gallon of milk, flavored with a couple of teaspoonfuls of vanilla extract, and set to gently heat. Now into three-quarters of a pound of sugar stir the yelks of fifteen eggs until thoroughly mixed. Beat up the whites of the eggs by themselves. The isinglass being dissolved, pour the milk containing it into the yelks and sugar, stirring the mixture; then add the beaten whites, and stir up well. If not flavored sufficiently, add more. If desired of a nicer quality, add from one to two quarts of cream, and a teaspoonful or two of brandy. But the latter had better be omitted, if there is any doubt as to its quality.

This mixture is now ready to go into the moulds. It should be promptly poured in, and the finished charlottes placed for a few minutes in a cool oven for the filling to set. The charlottes should be filled quite full, as they look much better for having a plump full top. Some makers finish by adding a little cubic block of fruit jelly to the top of the charlotte. Charlotte russe moulds can be had of all sizes of the confectioners' supply stores.

WAFFLES.

Though not generally made by bakers, waffles are occasionally made on a large scale, or become popular

in special neighborhoods. They are easily made, with the assistance of a waffle-iron. The proportions are:

Three pounds flour, one pound eggs, one pound butter or fresh lard, quarter pound sugar, and one ounce salt, and sufficient milk to make a batter that will pour freely into the waffle-iron or mould, which must be well greased. Waffles are served with sugar dusted upon the top.

CORN CAKE.

Corn bread is a household breakfast luxury, and is consequently not made by the professional baker; but corn cakes, which are really corn bread, intended to be eaten cold, are popular at the "Dairies." They are baked in round moulds, about three inches in diameter at the top and two and a half at the bottom, and about two inches deep. The cake thus baked will keep tolerably moist at least for twenty-four hours. The following will be found good receipes. Yellow meal gives the best results:

Corn Cake (No. 1).—Three pounds corn meal, scalded; one pound wheat flour, one quart sour milk, half pint molasses or half pound yellow sugar, one tablespoonful of salt, two tablespoonfuls bicarb. soda.

Bake one hour in small moulds.

Corn Cake (No. 2).—Four pounds corn meal, one quart sweet milk, half pint molasses or half pound sugar, one tablespoonful salt, one ounce baking powder. Bake as No. 1.

PASTRY.

The making of good puff-paste depends upon work —cool hands, good butter, and judgment. The latter mental quality is mainly called for in the use of the water necessary, which will depend upon the flour

used—good California or Richmond flour taking more than St. Louis, generally, and the latter more than that from the Northern and Northwestern States. The baker must judge by the paste under his hands.

FRENCH PUFF-PASTE, OR FEUILLETAGE (No. 1).—Equal quantities of flour and butter—say one pound of each; half saltspoonful of salt, the yelks of two eggs, rather more than a quarter pint of water.

Weigh the flour; see that it is perfectly *dry*, and sift it; squeeze all the water from the butter, and wring it in a clean cloth till there is no moisture remaining. Put the flour on the paste-board or slab, work lightly into two ounces of the butter, and then make a hole in the center; into this well put the yelks of two eggs, the salt, and about a quarter pint of water (the quantity of this latter ingredient must be regulated by the baker, as it is impossible to give the exact proportion of it); knead up the paste quickly and lightly, and, when quite smooth, roll it out square to the thickness of about half an inch. Presuming that the butter is perfectly free from moisture, and *as cool* as possible, roll it into a ball, and place this ball of butter on the paste; fold the paste over the butter all round, and secure it by wrapping it well all over. Flatten the paste by rolling it lightly with the rolling-pin until it is quite thin, but not thin enough to allow the butter to break through, and keep the board and paste dredged lightly with flour during the process of making it. This rolling gives it the *first* turn. Now fold the paste in three, and roll out again, and, should the weather be very warm, put it on the ice to cool between the several turns; for, unless this is particularly attended to, the paste will be spoiled. Roll out the paste again *twice*, put it by to cool, then roll it out *twice* more, which will make six *turnings* in all. Now fold the paste in two, and it will be ready for use. If properly baked and well made, this crust will be delicious, and should rise in the oven to a height of several inches. The paste should be made rather firm

in the first instance, as the ball of butter is liable to break through. Great attention must also be paid to keeping the butter very cool, as, if this is in a liquid and soft state, the paste will not answer at all. This paste will have a much better appearance than that made by the process of dividing the butter into four parts, and placing it over the rolled-out paste; but, until experience has been acquired, we recommend puff-paste No. 3. The above paste is used for everything that requires very light crust.

Puff-Paste (No. 2).—To every pound of flour allow the yelk of one egg, the juice of one lemon, half saltspoonful of salt, gill and a half cold water, one pound of fresh butter.

Put the flour on to the paste-board or slab; make a hole in the center, into which put the yelk of the egg, the lemon-juice, and salt; mix the whole with cold water (this should be iced in summer, if convenient), into a soft flexible, paste, with the right hand, and handle it as little as possible; then squeeze all the buttermilk from the butter, wring it in a cloth, and roll out the paste; place the butter on this, and fold the edges of the paste over, so as to hide it; roll it out again to the thickness of a quarter of an inch; fold over one-third, over which again pass the rolling-pin; then fold over the other third, thus forming a square; place it with the ends, top, and bottom before you, shaking a little flour both under and over, and repeat the rolls and turns twice again, as before. Flour a baking-sheet, put the paste on this, and let it remain on ice or in some cool place for half an hour; then roll twice more, turning it as before; place it again upon the ice for a quarter of an hour, give it two more rolls, making seven in all, and it is ready for use when required.

Puff-Paste (No. 3).—To every pound of flour allow one pound of butter, and not quite a half pint of water.

Carefully weigh the flour and butter, and have the

exact proportion; squeeze the butter well, to extract the water from it, and afterwards wring it in a clean cloth, that no moisture may remain. Sift the flour; see that it is perfectly dry, and proceed in the following manner to make the paste, using a very *clean* paste-board and rolling-pin: Supposing the quantity to be one pound of flour, work the whole into a smooth paste, with not quite a half pint of water, using a knife to mix it with; the proportion of water must be regulated by the dryness of the flour; if too much be added the paste, when baked, will be tough. Roll it out until it is of an equal thickness of about an inch; break four ounces of the butter into small pieces; place these on the paste, sift over it a little flour, fold it over, roll out again, and put another four ounces of butter. Repeat the rolling and buttering until the paste has been rolled out four times, or equal quantities of flour and butter have been used. Do not omit, every time the paste is rolled out, to dredge a little flour over that and the rolling-pin, to prevent both from sticking. Handle the paste as lightly as possible, and do not press heavily upon it with the rolling-pin. The next thing to be considered is the oven, as the baking of pastry requires particular attention. Do not put it into the oven until it is sufficiently hot to raise the paste, for the best-prepared paste, if not properly baked, will be good for nothing. Brushing the paste as often as rolled out, and the pieces of butter placed thereon, with the white of an egg, assists it to rise in *leaves* or *flakes*. As this is the great beauty of puff-paste, it is as well to try this method.

Medium Puff-Paste (No. 4).—To every pound of flour allow eight ounces of butter, four ounces of lard, not quite a half pint of water.

This paste may be made by the directions in the preceding recipe, only using less butter and substituting lard for a portion of it. Mix the flour to a smooth paste with not quite half a pint of water; then roll it out three times, the first time covering the paste with

butter, the second with lard, and the third with butter, and it will be ready for use. Keep the rolling-pin and paste slightly dredged with flour, to prevent them from sticking.

Common Paste (No. 5).—One and a quarter pounds of flour, half pound of butter, rather more than half a pint of water.

Rub the butter lightly into the flour, and mix it to a smooth paste with the water; roll it out two or three times, and it will be ready for use. This paste may be converted into an excellent short-crust by adding to the flour, after the butter is rubbed in, two tablespoonfuls of fine-sifted sugar.

Good Short-Crust for Fruit Tarts (No. 6).—To every pound of flour allow three-quarters of a pound of butter, one tablespoonful of sifted sugar, one-third of a pint of water.

Rub the butter into the flour, after having ascertained that the latter is perfectly dry; add the sugar, and mix the whole into a stiff paste, with about one-third of a pint of water. Roll it out two or three times, folding the paste over each time, and it will be ready for use.

Another Good Short-Crust (No. 7).—To every pound of flour allow eight ounces of butter, the yelks of two eggs, two ounces of sifted sugar, and about a quarter of a pint of milk.

Rub the butter into the flour, add the sugar, and mix the whole as lightly as possible to a smooth paste, with the yelks of eggs well beaten, and the milk. The proportion of the latter ingredient must be judged of by the size of the eggs; if these are large, so much will not be required, and more if the eggs are smaller.

Common Short-Crust (No. 8).—To every pound of flour allow two ounces of sifted sugar, three ounces of butter, about a half pint of boiling milk.

Crumble the butter into the flour as finely as possible, add the sugar, and work the whole up to a smooth paste with the boiling milk. Roll it out thin, and bake in a moderate oven.

Pate Brisee, or French Crust, for Raised Pies (No. 9).—To every pound of flour allow half a salt-spoonful of salt, two eggs, one-third of a pint of water, six ounces of butter.

Spread the flour, which should be sifted and thoroughly dry, on the paste-board; make a hole in the center, into which put the butter; work it lightly into the flour, and, when quite fine, add the salt; work the whole into a smooth paste with the eggs (yelks and whites) and water, and make it very firm. Knead the paste well, and let it be rather stiff, that the sides of the pie may be easily raised, and that they do not afterwards tumble or shrink.

Suet Crust, for Pies or Puddings (No. 10).—To every pound of flour allow five or six ounces of beef suet, half a pint of water.

Free the suet from skin and shreds; chop it extremely fine, and rub it well into the flour; work the whole to a smooth paste with the above proportion of water; roll it out, and it is ready for use. This crust is quite rich enough for ordinary purposes; but when a better one is desired, use from a half to three-quarters of a pound of suet to every pound of flour. Some bakers, for rich crusts, pound the suet in a mortar, with a small quantity of butter. It should then be laid on the paste in small pieces, the same as for puff-crust, and will be found exceedingly nice for hot tarts. Five ounces of suet to every pound of flour will make a very good crust; and even a quarter of a pound will answer very well for children, or where the crust is wanted very plain.

Lard Paste (No. 11).—Where the baking of pies is conducted on a large scale and the sales quick, as in some of the baking companies of New York, the following is used, and answers very well:

One barrel of flour, one hundred and twelve pounds (1 cwt.) best lard, nine gallons water.

In summer, iced water; in winter, water at the usual temperature. The lard and flour are mixed as

lightly as possible. The water is added afterward, and also worked in lightly as possible, without touching it with the hands. When rolled out, the top and bottom crusts are cut with tin cutters, transferred to the tins in which they are baked, as well as sold, and baked rather brown in slack oven. The above quantity will make about eight hundred ten-cent pies (allowing half a pound of dough to each pie).

PIE FILLINGS.

Mince (No. 1).—A first-rate mince meat is the following:

Of best raisins, currants, sugar, beef and beef suet, ten pounds each, two and a half dozen lemons, two and a half pounds citron, three and a half pounds sweet almond kernels, two and a half pounds bitter almond kernels, one hundred and twenty-five large greening apples, ten tablespoonsful ground cinnamon, two tablespoonsful cloves, ground, same of allspice, ten tablespoonsful salt, and ten nutmegs.

Boil the beef and chop fine separately; chop the suet, apples, almonds and citron separately; stone and chop the raisins; peel off the outer rind of the lemons as thin as possible, and chop fine. This is better than grating, as much of the oil of lemons is lost by the latter method. The almonds should be pounded in a mortar after being chopped, so as to come to a paste, or nearly so. The operation is facilitated by adding to the almonds occasionally a spoonful of brandy.

Finally, mix all the ingredients, and add half a pint best brandy, with a wooden spoon or paddle, or an iron one, which is well tinned. An old iron spoon. having some of the tin worn off, will impart a little of its flavor to the mince meat, unless it is in very constant use and kept very clean. This mince meat will keep, if packed in a stone crock, kept in a cool place,

and moderately well covered, three or four months. If put into glass jars, it should be kept in the dark.

MINCE (No. 2).—Ten pounds beef, ten pounds sugar, six pounds raisins, six pounds currants, one pound citron, two ounces cloves, one ounce nutmeg, one peck of apples, if sound; if not, a peck and a half.

Proceed as in No. 1, substituting cider for the brandy.

MINCE MEAT (No. 3).—Proceed as in Nos. 1 and 2, substituting, in each, a portion of seedless raisins for an equal portion of those containing seed. Seedless raisins are to be *chopped.* They swell in the baking, and there is a large class of customers (Germans and Hebrews) with whom the whole raisin is a favorite.

No. 4.—The same as No. 2, using for a part of the sugar molasses or sugar-house syrup. A pint of molasses may be considered the equivalent of a pound of sugar. This is for ordinary pies in large quantities.

APPLE PIE (No. 1)—Sliced. The apples are simply peeled, cored and sliced, filled into the bottoms in one course; sugar added in the proportion of six ounces to the pound of fruit; another layer of apples, another of sugar, and the top crust is put on.

APPLE (No. 2).—The apples are boiled, mashed to a paste, squeezed through a strainer, sweetened with sugar at the rate of six ounces to the pound, and flavored slightly with lemon, nutmeg, and used as in apple No. 1.

LEMON (No. 1).—Choice (for custom bakery):

One orange, one lemon, and one sour apple. Peel, take out seeds and cores; slice and simmer in just enough water to cover; strain, and mix with sufficient sugar to sweeten (about four ounces), and flour to make a creamy mass. This is one large pie, about twelve inches in diameter. No top to this.

LEMON (No. 2).—For large bakeries:

One bushel of apples, cored, peeled and boiled to pulp, with just enough water to do it; run through a

strainer. Take out the pips of three dozen medium-sized lemons, and grate them up into the apple pulp.

Lemon (No. 3).—Twelve dozen eggs, one pound corn starch, four dozen lemons, cleared of pips and grated, six pounds sugar, two pounds sweet almonds, blanched and crushed in a mortar, one pound bitter almonds, blanched and crushed in a mortar, two and a half citrons, cut into fine shreds, one bottle good brandy; heat gently and stir constantly until it boils and thickens.

Pumpkin.—This is baked in large quantities in the Eastern States. The pies are always deep—a full inch:

Peel and remove the seeds of eight pounds of good yellow pumpkin; slice, simmer soft, and mash; mix with sufficient scalded, not boiled, milk to make a thick batter. Add, for each quart of milk used, eight ounces sugar and four eggs. Beat up well, and pour into the bottoms. Grate nutmeg upon the tops.

(Bakers will find it convenient to have the nutmeg ready grated or ground, and used from a pepper-box for such operations as the last, as grating a nutmeg consumes too much time.)

Peach.—The peaches are halved and used raw, a few, or all, having the pits left in. If the fruit is small, use whole; if very large, slice. The pits add considerable to the flavor. Sugar, six to eight ounces to each pound of fruit.

Rhubarb.—If the rhubarb is young, use it raw, peeling the stalks and cutting into pieces of an inch in length. Use eight to twelve ounces or more of sugar to the pound of fruit, and flavor with lemon, either essence or grated rind. If the rhubarb is old, stew first, with an equal weight of sugar and half its weight of water. When a stiff pulp, use as a filling.

Plum.—Like peaches.

Cherry.—Use some, or all, with the pits; put into the pies with eight to nine ounces of sugar to the pound of fruit.

Gooseberry.—Clean the fruit and allow a gill and a half of water to every quart of berries, and simmer. When soft, strain and add nine to twelve ounces of sugar for each pound of the fruit, and boil thirty minutes.

Cranberry.—Like gooseberry. Many prefer not to have the stewed berries strained.

Currants.—Clean the fruit, and proceed as with gooseberries; or use the fruit raw, filling in the pies with nine to twelve ounces sugar to each pound of fruit, if the fruit is ripe; if green, more sugar. There is juice enough in these to cook them while they are baking.

Raspberry.—To every pound of clean fruit add four to six ounces sugar, and fill into the pies. They need no preparatory cooking. An improvement is to use one-fourth currants, in which case the proportion of sugar must be slightly increased.

Blackberry.—As above, with six to eight ounces sugar to the pound of fruit.

Whortleberry.—As raspberry.

Custard Pie.—The custard is prepared as follows:

One and a half pound eggs, one pound sugar, tablespoonful flour, two quarts milk.

Beat the first, add the next two ingredients, beat, and finally add milk; beat to mix thoroughly, and pour into the bottoms. Custards should be made in dishes not less than a full half inch deep.

Cocoanut.—One and a half pound eggs, one pound sugar, tablespoonful flour, one quart milk.

Proceed as in custard, and finally add a quarter of a pound desiccated cocoanut, which has been previously moistened with water; or the same quantity of grated cocoanut. Bake slower than custard, as it cooks the cocoanut better.

Cheese Cake.—Turn sweet milk by a piece of rennet or liquid rennet (which can be had of the druggist), and put into a warm place. When the milk has *clotted*, strain off the whey (or water part), and to

every one and a half pound curd (the thick part of the milk) add:

Three to four eggs, well beaten; eight ounces sugar, quarter ounce grated nutmeg; mix and fill a bottom crust, like custard.

This cheese cake may be varied by making it more or less rich with eggs; more or less sweet with sugar; by flavoring with lemon essence or lemon rind (in the latter case, the yellow part of the rind being rubbed off with lump sugar and used with the curd, two or three lemons being required), or by flavoring with orange. It is a popular cake in many parts of the world, and nearly every locality differs as to the mode of flavoring it. It is filled in and baked like a custard.

Meringue Pies (pronounced may-rang).—These are open fruit pies of any kind, baked first without top crust, and then covered about an inch deep with a light icing made in the proportion of the white of one egg to each tablespoonful of sugar, well beaten. This icing is poured upon the top, and the pie set back into the oven a few minutes for the icing to set.

Apple Meringue.—This may be either the pulped and strained apples as given in apple pie, or sliced apple; but the former is generally preferred in New York.

Lemon Meringue.—The lemon filling is prepared as in Lemon No. 3, and the Meringue icing added, as described under the paragraph "Meringue Pies."

All the fruit pies may be treated in the same way, but the meringue seems to suit the lemon and apple best.

Making the Pie.—The bottom crust is made a little larger than need be, so as not only to come up the side of the baking dish, but a little over the edge, and the edge all round the dish moistened slightly; the fruit is filled in, and the top crust, also a little larger than need be, laid on; then with the back of both hands press the top and bottom paste together on the edge

of the dish, pinching off the surplus paste; the lower crust having been moistened, the two are pasted well together keeping in the fruit juice. If the juice is kept in, the baking dishes will need no greasing. The top crust should be pricked, and, in large bakeries, the initial of the fruit is pricked into the crust, so that no mistakes are made in selling. The dough pinched off the edges is used for bottoms, or other work. Some pastry cooks like to trim off the edges with a knife, instead of squeezing with the hands, and finish with a little wheel made for the purpose, and sold by dealers in confectioners' materials. The hands are the quickest, and give the pies a plumpness in the center which is liked by the customers for pies sold by wholesale, as it gives the pies a home-made look.

Glazing for Pies, Etc.—City bakers finish their pies with a glazing which adds to their appearance. This is what gives the glossy look to what is specially known as French pastry. The method is to beat up the white of egg well, and with a brush give the top of the pastry a light coat; then dredge some powdered sugar upon it, and finish by giving a little sprinkle of of water from a brush. A similar effect on cheaper goods is to brush over some thin syrup made with white sugar.

Puffs and Turn-Overs.—These consist simply of puff paste formed in squares, filled with fruit (about a tablespoonful) or any other pie material, turned over so as to make a triangular shape, the edges which meet, moistened and pinched firmly together, glazed and baked. Another shape is circular before filling, and becomes semi-circular when turned over and closed. The triangular form is considered the most *Frenchy*, and the best puff paste only is used for them. At Delmonico's, Rudolph's and other fashionable down-town restaurants, this is a popular form of pastry.

Baked Dumplings.—In New York and vicinity, and in Boston, the baked dumpling has almost super-

seded the boiled article. Baked dumplings are made with any fruit in its natural state, put into the middle of a square of puff paste, the corners of which are turned up and fastened by moistening the place where they lap over, in the usual way; the dumpling is then glazed and baked exactly as a pie, but a little longer. No sugar is added to the fruit previous to baking, as the sauce with which it is eaten supplies that. All the pie fruits can be used for dumplings. In using apples, the fruit is cored with a corer, and peeled and halved so as to insure thorough cooking; this also gives a chance to pick out small pieces of the core that might be left. With peaches, a single large peach is used, and the pit is left in. Two small peaches may be used. Blackberries are also used for dumplings, but the other fruits not much.

Boiled Dumplings.—A crust may be made as follows:

One pound flour, two eggs, half pint milk, half ounce baking powder.

Mix and work into a moderately stiff paste, with more flour if needed; roll out into squares about a quarter inch thick, and put the fruit in as described in baked dumpling, but be sure that the cover is so tight that no water can get into the dumpling. Boil forty-five minutes to one hour. This makes a fair article when fresh, but if an hour old, even if kept warm, it gets tough. A better crust, more laborious to make, however, is:

One pound flour, half pound suet, two eggs, milk to mix.

Chop the suet fine and mix with the flour; add the eggs, beaten, and then the milk to make a stiffish dough. Roll out and proceed as in preceding paragraph.

Tarts.—All the pie fruits, preserves, jellies, jams and other fillings may be used for tarts, which are merely good puff-paste cut into small, round pies *without* top. They may be made deep in tins for the pur-

pose, or they may be baked flat on baking sheets. In the case of raw fruits they must be made deep to hold the juice; in the case of preserved fruits and jellies they can be baked flat. A not unusual form of tart is one in which the paste alone is baked, and the jam, jelly or preserved fruit put in just before serving. This makes a very good tart and is quickly prepared.

It adds to the attractiveness of tarts to have a little ornamental work of pie crust on the top of the fruit. This usually consists of strips of the paste crossed and fastened to the edge of the bottom crust by moistening the ends and pinching the two crusts together.

Mutton Pies.—These are made by bakers who keep lunch-counters, by restaurant pastry-cooks and by wholesale bakers in large cities. When fresh they sell readily, for they can be afforded at reasonable prices of an excellent quality, as the cheaper parts of the mutton can be used. The method is simple enough. Line a dish of the proper dimensions—these in city lunch bakeries are 2½ to 3 inches in diameter and about ½ inch deep—with a paste such as is designated under the puff pastes either No. 9 or No. 10. Put in the mutton, with proper seasoning of pepper, salt, and some like a shred of parsley and thyme. The latter must be very sparingly used. Add a tablespoonful of water. Put on the lid and bake a light brown in a quick heat. Beef, veal and pork pies are made in the same way. Beef should not be seasoned with anything but pepper and salt, though a little fat bacon may be used with it. Pork will bear high seasoning.

Oyster Pies.—These are made in two ways. The first method is to line the dish with a good puff paste and bake it. Then put in the oysters raw, with a little salt and a teaspoonful of milk and a tablespoonful of their own liquor. Put on the top crust and bake 8 to 12 minutes.

The second method is to stew the oysters first in their own liquor and an equal quantity of milk for a few minutes, until they are plump. Then, having the

dishes lined with puff paste, fill two-thirds full of oysters and juice, add crushed crackers a teaspoonful, salt and pepper. Put on the cover and bake until a light brown. The pies are better without the crushed cracker, but the latter makes the oysters go farther.

Vol au Vent.—This is a peculiar form of patty or tart in which a foundation of pastry serves for the reception of fruit, meat or oysters. The mode of preparing it is as follows: Roll out good puff paste into a circular sheet about 2½ inches in diameter, and from a half inch to an inch in thickness according to the quality of your paste. If the latter is calculated to rise in the baking very much, it must not be so thick—in other words, the richer your puff paste the thinner you make your *vol au vent* in the beginning. Then mark, on the upper side of your round paste a ring say of an inch and a half in diameter. This may be done with some round tin box lid or a cutter made for the purpose. Do not cut through the dough, go about one-third the depth. Now bake the paste lightly, say about three-quarters. Withdraw it from the oven, and with a knife-blade take off the round center of the crust within the mark you made. This will be easy, as it is separated from the rest of the crust by the mark you made. This is intended for a lid to the *vol au vent* when done. Now dig out the center of the *vol au vent*, so that it will receive the fruit, meat or oysters you intend to insert. Put in any filling you wish, seasoned as directed in previous recipes. Put on the lid and bake again until done, say eight to twenty minutes. This is a popular form for serving up oysters in many New York lunch bakeries and restaurants, and is quite profitable.

MERINGUES.

Meringues may be described as baked icing. They are made as follows: To the whites of ten of the freshest

eggs you can procure add gradually twelve ounces powdered sugar, working the two together with a long, light sweeping motion. This must be in a deep dish or pan, free from grease. When the mixture is stiff enough to hold its form, have some planed inch boards, convenient to handle, which have first been soaked in water, covered with sheets of writing-paper. Form a portion of the meringue with a tablespoon into a round mass and drop it upon the paper; this soon settles by its own weight to the proper shape. Follow this method until your material has been used up, sift some powdered sugar over them, and then put the meringues, board and all, into a very moderate oven, so that the meringues may set firmly and brown lightly on top. When you perceive that they are stiff and a little brown, take them out, lift them off the papers with a palette knife, and dig out or crush in the soft bottoms. The object of the water-soaked boards is to keep the bottoms soft. After the bottoms have been dug out or crushed in, put the meringues on a baking sheet and give them ten to fifteen minutes more in the oven to harden. When done, take out and fill the inside with a cream prepared for the purpose, flavored with vanilla or almond, or with any preserved fruit, stick two meringues together and serve. None of the contents of the meringue should show on the outside.

MACCAROONS.

One pound sweet almonds, one ounce bitter almonds, one pound and a half of sugar, whites of eight eggs.

Blanch the almonds (that is, scald them and slip off the skins), shred or chop them and then reduce to a paste in a mortar, adding every few minutes some of the sugar with the frequent addition of a drop or two of simple water, lemon-juice or orange-flower water. When re-

duced to a paste, pass through a flour seive, and add the whites of the eggs. If the almond paste is dry and tough use the larger quantity of eggs, if moist, use less. Beat well together, and try by baking one or two drops (it takes but a few minutes). If the drops keep their shape, all right, if not, add a little more sugar; if too stiff, add a little white of one and mix again. When just right, drop them on an oiled or waxed paper with the confectioner's pipe and bag, an inch apart, and give a dust of sugar. If they do not open or crack nicely on top, as they should do while baking, brush over or sprinkle lightly with water. Bake on a baking sheet in a moderate heat to a golden brown.

Italian Maccaroons.—Are the same as the ones described except that they are rolled in or covered with the small comfits or nonpareils (see Haney's Candy Maker, page 65). The comfits used are white only, and the heat employed is hardly more than a drying heat so as not to color them.

Almond Cakes.—Same as plain maccaroons, only slightly larger and with bits of cut almonds stuck in the top.

Swedish Maccaroons.—One half pound sweet almonds, one half ounce bitter almonds, one half pound powdered sugar, two ounces maizena, one egg, and one orange.

Blanch the almonds and chop them tolerably fine, but do not crush them. Mix all your ingredients, except the orange, rub off the yellow part of the rind of this on lumps of sugar and add to the ingredients. Squeeze the orange juice into the mass and stir well up. Form into rounded balls size of an English walnut, give a dust of sugar and put on a baking sheet an inch apart and bake a light brown.

Pea Nut or Ground Nut Maccaroons.—In the same proportions and same method as almond maccaroons, but using pea nuts only instead of almonds. Be careful to remove the skins. A heaped teaspoonful of flour should be added to every pound of nuts.

Chocolate Maccaroons.—As almond maccaroons, using one half pound almonds and one half pound chocolate instead of one pound almonds. A teaspoonful of flour helps to give proper adhesiveness to the mass, and should be added.

Wafers, Wafer Kisses, Almond Wafers.—Quarter pound sweet almonds, three quarters pound sugar, quarter pound flour, two pounds egg whites.

Treat sugar and almonds as for maccaroons, beat the mixture with two pounds of egg whites and add the flour. Stir the whole well together until intimately mixed, then lay out one-eighth of an inch thick—round, oval or square—on a baking sheet or waxed paper, and let them set for a minute or two. Bake them a light brown and as soon as done curl them and insert in a board with inch-augur holes all over it, so that they will keep their shape, or curl them around a round iron or stick, and as soon as they are set, put them into paper bags, or glass jar, or tin box, which can keep them from the air.

These wafers are sold in this shape without filling, as well as filled with a cream or batter like that used for cream cakes. When they are required filled they should be curled in cone form like the ordinary bag a grocer makes, so as to retain the cream.

Wafer No. 2.—One pound flour, one pound sugar, nine egg whites, teaspoonful vanilla essence, small teaspoonful salt, one quart cream, two tablesponsful brandy.

Work well together into a nice batter, bake an eighth of an inch thick, as in No. 1., and curl as before, or leave flat. The curl adds to their inviting appearance and helps the sale. The method of laying out wafers is to drop sufficient of the batter upon the oil or paper, and with the back of the spoon, working it down to the required thickness and shape, or to use a wafer-iron, which is made for the purpose, and which bakes the wafer from the two sides.

Wafer No. 3.—One pound flour, half pound sugar,

fifteen egg whites, one tablespoonful of salt, twenty drops vanilla essence, two tablespoonsful brandy, or any cordial or liqueur to taste, one quart of cream.

Add the whites and cream after all the rest of the ingredients have been well mixed. Work into a smooth paste and then bake them as in the preceding recipes.

GINGERBREADS.

On the large scale, bakers will use alum for their gingerbreads, probably in the belief that alum gives the baked product a keeping quality which otherwise it would not possess. We need not say that alum should never be used. The basis of it is insoluble in the stomach, and its particles are apt to lodge and form nuclei for the formation of stone and gravel—distressing complaints, which are becoming more widely spread every day. We give the alum formula, however, as well as others in which its use is avoided. The gingerbreads baked without alum are in every way as good in point of flavor and appearance as those with alum. It is only in their resistance to the moisture of the atmosphere that there is any difference between the two.

The chief difficulty in making gingerbreads is to get them light enough. If newly mixed the snaps or cakes will not be light enough. Hence, the dough, which gives the lightness, is prepared some time in advance. This is done as follows:

Method (No. 1).—Fifty-six pounds molasses; dissolve two pounds alum in two quarts of hot water. When dissolved, bring to a boil, or boil and replace any water that may be lost by evaporation. When dissolved and boiling, turn into the molasses and stir it well. At the same time dissolve four pounds carbonate of potash or pearlash in two or three quarts of water, and add this to the mixture. Stir well, add

sufficient flour to make a stiff dough. Set this away for six to eight days, and use it under the name of old dough, as will be shown in the recipes.

Now prepare another fifty-six pounds of molasses in precisely a similar way, excepting the flour, and only make the dough when wanted. This is called "new dough."

The old dough is used for the rising.

Method (No. 2, for Snaps).—Work up fifty-six pounds molasses, and one-half pound alum and one-half pound soda, in the same way as above. Mix with sufficient flour to make a good stiff dough. Allow it to ripen for eight or ten days, and then mix with the flavoring ingredients, without any new dough. We shall call this method No. 2.

Thick Gingerbread (No. 1)—For large bakeries. One hundred pounds old dough, fifty pounds new dough, twelve pounds new sweet lard or butter, twelve pounds yellow sugar, three pounds ginger (ground), one-half pound cayenne pepper, three pounds mixed spices. Make a stiffish dough, and put into such sizes as you adapted to your business. It should be from an inch and a quarter to two inches thick, when baked. Some bake in deep square pans, making a deep groove lengthwise with a confectioner's hoar-hound cutter. This allows long strips of a definite size to be cut. The tcp should always be pricked. Ornament in any way. Gingerbread may be baked on flat sheets, with movable wooden sides high enough to keep the dough from curling over. Do not touch the cakes until they are nearly or quite baked, or they will fall and become heavy. Keep the oven door shut, while they are baking, as much as possible. Moisten the tops with water before putting into the oven, and glaze them with a little thin gelatine water when they come out. Several cakes may be baked side by side on the baking sheet if the sides of each have a touch of the grease brush.

Snaps.—For large bakeries: Take fifty pounds

dough prepared as in method No. 2; add ten pounds sweet lard, fifteen pounds yellow sugar, one and a half pounds powdered ginger or one pound ginger and one-quarter pound cayenne pepper; work thoroughly; roll out to a thickness of one-eighth inch. Cut out the snaps with a tin cutter; put on baking sheet and bake in a lively heat. These snaps remain firm quite a long time if kept with any care.

Ginger Nuts.—Spice nuts may be made the same way—rolling out the dough thicker and cutting it into long strips. Then, with a scraper, cut off equal portions from several strips at once; give each lump half a turn between the two hands to partly round, and throw as fast as made into a seive, with a dust of flour over them. When you have a seive full give the seive a dextrous twirl or two from left to right, and it will complete the rounding. Put on baking sheets and bake like snaps. The nuts may also be formed by passing strips of dough through a machine built for the purpose and similar to machines for forming candies into specified shapes. The dealers in confectioners' materials keep this sort of machine, as also do the dealers in cracker machinery.

Ginger Nuts (No. 2).—One barrel of flour, twenty gallons sugar-house syrup, eighty-four pounds yellow or brown sugar, forty-two pounds butter or sweet lard, seven pounds ginger (ground), one and a half pounds cinnamon, one-quarter pound red pepper, fourteen ounces carbonate of soda, seven ounces muriatic acid.

No. 2.—One barrel of flour, twenty gallons syrup, thirty-six pounds brown sugar, twenty pounds butter or fresh lard, four pounds ground ginger, one-half pound carbonate of soda, one-half pound muriatic acid, two ounces essence of lemon.

No. 3.—One barrel flour, twenty gallons molasses or syrup, sixty pounds brown sugar, forty pounds butter or lard, six and a half ounces cream tartar, six and a half ounces muriatic acid, one and a quarter pounds carbonate of soda, seven pounds ground

ginger, three-quarters of a pound ground cinnamon, three ounces essence of lemon.

The above are all made in the same way. The flour and sugar are sifted together, butter or lard rubbed in, the spices are added, and a bay made for the molasses. Dissolve the soda in very little water, pour into the middle of the bay, add the molasses, stir in some flour, then add the muriatic acid, stir in more flour, add the cream of tartar, and then finish working it as soon as you can. Let it be a rather soft dough. Form into nuts by the speediest method, and get them into a moderate oven.

On the small scale the following will be found better recipes to follow than those given for large bakeries.

Ginger Snaps.—One pound sugar, one pound butter or lard, two pounds molasses or syrup, one pound water, two ounces carbonate of soda, four ounces powdered ginger, one ounce cayenne pepper. Mix with flour to make a stiffish dough, cut out, bake in a moderate oven. Omit the pepper if it makes them too warm. A few drops of essence of lemon is liked by many.

Ginger Cakes.—The same as above, doubling the proportion of soda. Work lightly together, pour into pans any depth from one-quarter of an inch to three-quarters, pass a wet brush over the top and bake in a lively oven.

White Ginger Nuts.—Four pounds flour, two and a half pounds granulated sugar, four ounces butter or lard, one pint milk, one ounce carbonate ammonia, one-half ounce ginger, one-half ounce caraway seeds, one-quarter ounce cinnamon, nutmeg and mace each. Rub the butter in with the flour, add the sugar with the spices; make a bay, pour in the milk, having previously dissolved the carbonate of ammonia therein; mix into a stiff paste, and add a teaspoonful of essence of lemon. Work and shape one or two; try in the oven. If they do not crack sufficiently, add a little more ammonia dissolved in milk. Some of the spices may

be omitted, and the nuts may be made hotter by adding a half teaspoonful of cayenne pepper.

Honey Cakes, or Honey Gingerbread.—Three pounds flour, one pound and three-quarters brown sugar, one-half pound preserved orange peel, one-half pound preserved lemon peel, one-half pound blanched almonds, one ounce cinnamon powdered, one-quarter ounce cardamons, cloves, nutmegs, mace, powdered; yellow rind of two lemons rubbed off on sugar lumps, two pounds honey, one gill water. Heat the honey and water together in a sauce pan; make it nearly boiling. Mix the flour and spices dry, the peel and almonds having been previously chopped fine; make a bay, and pour in the honey-water, hot, and mix to a tolerably stiff dough. Let it stand to next day. Then mix with it one-half ounce carbonate of ammonia, or soda dissolved in a little milk, and work into a dough again. Roll it out one-quarter to three-eighths of an inch thick; put on buttered baking tin and bake. This is also iced in some places with grained sugar. The method is to boil some loaf sugar in a copper sauce pan to the blow (see Haney's Candy Maker); to grain the sugar against the sides of the pan with a spoon; that is, to rub so that it looks opaque and white, not transparent, and then to pour it upon the gingerbread and spread it with a knife.

German Gingerbread.—Same as the last, but baked on floured baking sheets instead of greased ones. It makes the bottoms somewhat different in appearance and consistency.

Ginger Wafers.—One pound flour, one pound brown sugar, one-half pound butter or lard, one ounce ground ginger, yellow rind of two lemons rubbed off on sugar lumps. Rub the butter into the flour; add all the sugar, and mix, with the aid of their syrup or molasses, into a thin paste. Drop upon baking sheets about an inch in diameter, four or five inches apart, as they are intended to spread to a diameter of two to three inches. Bake in a moderate oven, and when

still warm, curl them around a stick (mandril) or give them a twist with the fingers, and insert in a board full of holes for the purpose. When cool put away in closed tins.

GINGER JUMBLES, ITALIAN JUMBLES, BRANDY SNAPS. —These are all made like the last, with these exceptions. The sugar is slightly increased, and only one-third the proportion of ginger is used. The brandy snaps are sold flat.

LEMON CAKES.—Take any portion of molasses, prepared as in the manner first described on page 92, and in an earthern pan; make it to a soft batter with flour. Flavor with essence of lemon and fill into small pans well buttered. Bake in a moderate oven. If the first do not stand up enough, add a little flour; if they appear too tight, add molasses. When they are done, take them out; allow a few minutes to cool, then put them into the proving room, or closet, or into an exhausted oven to dry hard.

Other forms of gingerbread are only variations of these recipes, which will suggest themselves to any baker. There are cutters that will produce popular shapes, which can be purchased of the confectioners' supply stores, or new shapes may be devised. In some quarters, sheet gingerbread is given a dab of red, blue and white sugar. The baker should be careful that his colored sugars are innocent. Ingenuity and taste have a field here as elsewhere in charming the pennies out of the pockets of the customer.

ORNAMENTING CAKES, &c.

We have already given a description of icing on a previous page. In making icing it is well to remember that putting in sufficient lemon juice to make the icing taste acid will prevent its scaling off in flakes. This makes the icing hard and adherent, and by many

it is preferred softer, but for pastry and ornamental work it should be made hard, as we suggest above.

On Piping Cakes.—This is a method of ornamenting wedding cakes and other articles with icing, by means of small pipes or tubes; these are often made with writing paper folded in the form of a cone, in the same manner as a grocer makes up his papers for small lots of sugar, tea, &c. The tube is filled with icing, made as for cakes, the base of the cone, or the place where it was filled, is turned down to prevent the sides opening, and the escape of the icing; the point is then cut off with a sharp knife or scissors, so as to make a hole sufficiently large to form the icing, when squeezed or pressed out, into a thread of the required size, and which will either be fine or coarse according to the length of the point which is cut off. If the hole at the point of the cone is not perfectly straight when the icing is pressed out, it will form a spiral thread, which is very inconvenient to work with. Stars, borders, flowers and different devices are formed on cakes after they are iced, the execution of which depends on the ability and ingenuity of the artist. Baskets, Chinese and other temples, &c., are formed on *moulds* by these means, first giving them a coating of white wax, which is brushed over them after it is melted, and when cold, the icing is formed on it like trellis-work; when finished the mould is warmed and the icing easily comes off. Some of the pipes which are used cannot be formed with paper, as the tape and star-pipes, which are made of tin, having a bag fastened to them in a similar manner to that generally used for dropping out Savoy biscuits, macaroons, &c., only much smaller, the point of the tin tube of the one being fluted to form a star, and in the other it is flat, so that when the icing is forced or squeezed through, it comes out in a broad, thin sheet, like a piece of tape. There are special machines, bags and tubes made for this work by those who supply confectioners' materials. They are not costly, and do the work

easier than home-made implements. These pipes should be, in the hands of the confectioner, what the pencil or brush is to the painter—capable of performing wonders with men of genius. Some of the bonbons, which may be seen in the shops, are proofs of what I assert; and many things are so cleverly done, that many persons would believe that they were either formed in a mould or modelled. I have not space to enlarge further on this subject, but much more might be given in explanation; therefore the, artist must be guided by his own genius and fancy.

GUM PASTE.—Take one ounce of picked gum-tragacanth; wash it in water to take off any dust or dirt; put it into a clean pot, and pour on it rather more than less, half a pint of water, or sufficient to cover the gum about an inch; stir it frequently, to accelerate the solution; it will take twenty-four hours to dissolve; then squeeze it out through a coarse cloth, taking care that everything employed in the making is very clean, or it will spoil the color; put it into a mortar, adding gradually six or eight ounces of powdered loaf sugar; work it well with the pestle, until it becomes a very white, smooth paste; put it into a glazed pot, cover the paste with a damp cloth, and turn the pot upside-down on an even surface, to exclude the air. When it is wanted, take a little of it and put it on a clean marble, and work some more sugar into it with the fingers until it is a firm paste, which will break when pulled; if it is not stiff enough, it will roll up under the knife when you cut it from the impressions in your paste board; if it is too stiff, work in a little of your prepared paste with it, to soften it. When your paste works harsh and cracks, it has too much gum in it; in this case use a little water to work it down; and if the gum is too thin, it will crack and dry too soon from the excess of sugar, therefore add some more strained gum that has not been mixed with sugar. If it is required colored, add a little prepared cochineal, or any other color in fine powder; mix it in on the

stone. If they are to be flavored with any essence, add it at the same time. This paste is fit to be eaten.

Common Gum Paste.—Take some of the prepared paste, as for the last, and work into it on the stone some very fine starch powder, using equal quantities of starch and sugar. This may also be made with rice flour, instead of starch. These are chiefly used for pièces montées, or stock pieces. It may be moulded or modeled into any form, or cut out from figures or borders carved in wood, called gum-paste boards, using a little starch powder to prevent its sticking whilst working it; a little tied up in a small muslin bag is the handiest for use. When you want to get the paste from the impressions in the boards, take a small piece of paste and press it at each end; if it does not come out very readily, moisten the piece and touch that in the impression at three or four places, which, being damp, adheres to it and draws it out.

This and the next preparation may be used for copying any ornament you may see, by taking an impression of it.

Gum Paste, for Ornaments.—Prepare some gum, as before; moisten plaster of Paris with water, making it of the consistence of thick cream; let it set, and dry it in the stove until perfectly dry; pound it, and moisten it again; let it dry as before; then pound and sift it through a lawn sieve, and use it to mix with the gum instead of sugar; add a little starch powder to harden it. This is principally used for making the ornaments which are put on cakes for showy or great public occasions. If any parts are required to be put together, the paste should remain until half dry before it is finished, as it is very apt to shrink. Not to be eaten.

Paste for Gilding on.—Take some dissolved gum, as before, and make it into a paste with whitening ground very fine, adding a little starch powder to finish it; or it may be made with some of the prepared sugar gum-paste, finishing it with whitening and starch powder.

Papier Machee.—Take the cuttings of either white or brown paper, and boil them in water until reduced to a paste; press the water from it when cold enough, and pound it well in a mortar; put it into a pan or glazed pipkin, with a little gum Arabic, or common glue, made into rather a thick mucilage with water; this is to give it tenacity; place it on the fire and stir it until well incorporated; if it is not stiff enough when cold, flour may be added to make it of the proper consistence; it should be about the same substance as gum-paste. This may be used for forming the rocks of a pièce montée, or for vases, &c.; in fact, anything you desire may be made with it, as with gum-paste; it is very durable, not being easily broken, and is very light; it is now much used, instead of composition, for the decoration of rooms and articles of furniture. It may be moulded or modeled into any form, or cut from impressions in wood or plaster, &c. When the object is dry, give it a coating of composition, made with parchment size, and whitening or lamp-black, mixed to the consistence of oil paint, according to the color it is required. Smooth it with glass paper, and paint or gild as wood, or japan it.

To Gild Gum Paste, &c.—Those articles which are gilt are seldom intended to be eaten, therefore first give them a coating of parchment size and whitening, as the papier machée, or paint them with oil color. When this is dry, brush over a coat of gold size, and let it remain until nearly dry, or so as it will stick to the fingers a little; then take a small dry brush, termed by gilders a tip; rub a little grease over the back of your hand, and pass the brush over it gently; apply it to the gold leaf, which it will take up, and place it on the part you intend to gild; blow on it to make it smooth; the gold leaf may first be divided into small pieces with a knife on a leather pad or cushion, to suit the size of your work; rub it over gently with a piece of wool, to make it appear glossy. Those parts which have not taken the gold, just

breathe on, then apply a small piece of the leaf, and rub again with the wool. If your piece is intended to be eaten, let the paste be perfectly dry and smooth; then prepare some mucilage of gum Arabic, strain it, and grind it well with an equal portion of white sugar candy; lay it over the part you intend to gild with a stiff brush; when dry, breathe on it, so as to moisten it, and gild as before.

To Bronze Gum Paste.—Prepare your object, if not to be eaten, as for gilding, giving it a coat of invisible green, prepared with turpentine, a little japan gold size, and a small portion of oil; when it is nearly dry, dip a fitch pencil in some bronze powder, shake off the loose pieces which hang about the brush, and apply it to the parts you wish to assume the appearance of copper which are in general the most prominent.

Another method.—Smooth your figure with sand-paper, and give it a coat of dissolved isinglass, or parchment size; when this is dry, give it a coat of color made as follows: Take a sufficient quantity of prepared indigo and a little yellow ochre or saffron, in such proportions as to make a deep green; grind them together with white of egg and powdered sugar-candy, or with parchment size; give it a coat of this, and when nearly dry apply the bronze as before.

Of Pieces Montees.—These are in general made to represent buildings of all descriptions, fountains, trophies, vases, cups, helmets, the last being generally mounted on pedestals and filled with flowers, fruit, &c.; also rocks, bridges, fortifications, &c., &c., the building, &c., being generally made with gum paste, confectioners' or almond pastes. The bodies of rocks may be formed with pieces of rock sugar, cakes, biscuits, &c., of all descriptions, being fixed together with caramel sugar; those not intended to be eaten may be made with papier machée and common gum paste; the rocks or bottoms of these are often formed with pieces of cork, flocks, and paper, the surface being

afterwards covered with a coating of very thin icing, which is applied with a brush.

To construct your pieces with accuracy, first cut out your intended design in stout paper, in suitable parts to be put together; then roll out the paste thin on a marble stone; lay your pattern on it, and cut your paste to it with a small, sharp-pointed knife; let it dry, and fix it together with some dissolved gum, or a little gum paste made rather thin with water. Cut your ornaments or decorations from pasteboards; let them dry a few minutes, and fix them in their proper places. Water may be represented with a piece of looking-glass, and falling water with silver web or spun glass.

Biscuit Paste to Imitate Marble Rocks, &c., for Pieces Montees.—Prepare some paste as for sponge cakes; take one-third of the mixture, and add to it some dissolved chocolate; stir the whole well together, and divide into two equal portions; to one part add some more of the mixture, when you will have a light and a dark brown; mix together some prepared cochineal or carmine and infusion of saffron, to make a dark orange, and stir this into another portion of paste; divide it, and add to one part some more of the paste, which will give a light and dark orange; butter or paper a square tin, and put in a spoonful of each colored paste in rotation, spreading it with the spoon so as it may appear in layers, beginning with the dark colors, and so alternately until the whole is used; or one-half of each may be put into another tin, and mixed all together, so that it may appear in veins; bake in a moderate oven, and when cold cut it into pieces as it is required, to represent pieces of rock, marble, &c. For variety, the paste may be colored with spinach green, infusion of saffron, red and blue, and either put in layers or mixed together as before.

Pate d'Office, or Confectioners' Paste.—Take one pound and a quarter of fine flour and ten ounces of powdered loaf sugar; make a bay, and put in it a

sufficient quantity of the yelks or whites of eggs, or whole eggs, to make it into a moderate stiff paste; work it well, and make it quite smooth; let it remain covered over for a short time, that it may get mellow. If this paste is required white and delicate, use the whites only of the eggs. This is used for the framework or building of the pièces montées, or for the bottom or foundation on which you build your biscuits, sugar, &c. Roll it out on an even board or marble slab until it is about one-sixth of an inch in thickness, or more, according to the weight it has to bear. Dust your sheet, and roll it on the pin; then lay or roll it over a baking-plate slightly buttered; press out any air-bladders which may be underneath, and prick it with the point of a sharp-pointed knife in a few places; lay on your patterns, cut it out to the desired form, and bake in a moderate oven; or it may be cut out when the paste is half baked, and finish baking it afterwards; or it may be dried in the stove instead of being baked. If it should be blistered when it is taken from the oven, put it immediately on an even board, and place another on it; remove it when it is cold, and it will be quite straight.

This paste may be made with the addition of half an ounce of dissolved gum-dragon, pounding it well in a mortar, and using less eggs. Each of these may be colored to any desired tint, when it should be dried in a stove instead of being baked. Fix the parts together when finished, with some of the same paste made thin with dissolved gum, or with caramel sugar; ornament it with spun sugar, or with colored sugar-sands.

From this paste, or almond paste, may be made cottages, temples, fountains, pyramids, castles, bridges, hermits' cells, vases, or any other required forms, which are to be made in different pieces and put together afterwards, or formed in moulds, and either baked or dried in the stove.

Modeling.—The human figure, animals, &c., can only be modeled by the aid of modeling tools, which

can be purchased of the dealers in artists' materials. Little books teaching the art can also be secured in the same way. The expense is not great, and any ambitious young baker or confectioner, who has a little taste for art, can, by their help, soon pick up enough skill in the tools to considerably increase his earnings and reputation in his profession.

CRACKERS OR BISCUITS.

Crackers are now made almost entirely by the aid of steam or water power and special machinery, which not only mixes and brakes or kneads the dough, but delivers it cut into the required shapes, and in sheets for the oven. The ovens themselves are made automatic, so as to bake and deliver the finished work continuously. So we shall not enlarge greatly on this portion of the business; but we will give some of the principal recipes for the mixing, merely giving the old adage of the cracker baker—a batch well mixed is half braked, meaning, of course, that work well done at one stage of the proceedings makes the next stage easier.

Hard Tack.—Army bread, or ship bread, as furnished to crews. One barrel of flour, 25 gallons of water (more or less; enough is wanted to make a stiff dough, no more). Cut out oblong, about 3 by 2½ inches square, for army use, as they pack more closely in the boxes in which they are sold. For sea use they are generally cut out round. They are docked one side, baked in slackish oven, to dry out thoroughly, and by some bakers kept in a drying room 24 hours after baking. If properly kept, they will remain good a long time, and have no bad flavor even after the weevil gets in.

Sea Biscuit, Captain's Biscuit, or Pilot Bread (Best).—One barrel of flour, 50 pounds of butter (salted but not rank), or half butter and half good lard,

7 gallons of water or milk, or half of each. Rub the butter in the flour until it is mixed and crumbly; make a bay; pour in the milk, or water; mix to a dough. Brake well; roll thin; dock them on one side, and bake in a quick oven. These are known in some quarters as captain's biscuits, as they were intended for cabin use. A variation of this biscuit is, to mix with it sugar, 12 pounds to the barrel. If half lard is used, put in 1 pound of salt; if all lard, 2 pounds of salt.

Sea Biscuit (No. 2).—Same as the last, omitting milk and using half the proportion of butter or lard. Roll out thicker, about 3 to 3½ inches in diameter.

Sea Biscuit (No. 3).—The same, with only 7 pounds of lard, 2 pounds of salt.

Passover (Unleavened) Bread.—One barrel of flour, 50 pounds of beef suet, 7 gallons of water. In some cases twenty-five pounds of beef marrow and an equal quantity of suet is used instead of all suet. The latter is freed of skin, chopped and mashed in a large mortar or other convenient receptacle. It is then used like the butter in the foregoing recipe. The suet and marrow must be of "Koscher" beef, that is beef approved by the Hebrew authorities, which always has a stamped tag of thin sheet lead, to indicate the approval. Weigh the dough into pieces of about three ounces each; "drive" them out very thin into biscuits of about ten inches in diameter, with a polished iron rolling pin, and dock them, and bake in a very quick oven. They come out very crisp, and hold their crispness a long time if properly stored.

Abernethy Biscuits.—This is said to be an unleavened biscuit, invented by Dr. Abernethy for the use of dyspeptic patients. Fourteen pounds of flour, 1 pound of sugar, 1 pound of butter, 1 pound of eggs, 1 ounce of caraway seeds, 3 quarts of milk (more or less, as needed). Mix butter and sugar; add the flour, then the milk, and finally add seeds. Brake or knead as sea biscuit. Take up about 2 pounds of the dough

at each time, give it another braking, roll out, and cut into biscuits weighing from $1\frac{1}{2}$ to 2 ounces. Dock on one face, and bake in a more moderate heat than for pilot bread. They can be baked after the pilot bread comes out of the oven.

LEAVENED CRACKERS.

Soda Crackers.—In making soda crackers the object is to get the fermentation to such an advanced stage that the necessary soda put in to sweeten it will also be sufficient to make the cracker flaky or short. One barrel flour, 2 gallons ferment as for bread, 30 pounds salt butter (not rank) or same quantity of good lard; if lard, use 3 pounds of salt. Set a sponge with the ferment and ten quarts of water; let it stand until the sponge drops. Mix in the rest of the flour, except a few pounds for final operations, with about five gallons of water, having the salt dissolved in it, if any is used, and let the dough stand until sour. Now, with from one pound and a half to two pounds of bicarbonate soda dissolved in water, sweeten the dough; mix thoroughly, and add what flour is left to stiffen the dough; brake well, and cut into shape, and bake in a quick oven.

Boston Crackers.—The same as soda, except that less shortening is used. The Boston is made round and nearly twice the thickness of the soda; is docked on one side, so as to make it split easily.

It is usual with soda and Boston crackers, to try the dough, after adding a portion of the soda, by baking a small piece, the object being to avoid the yellow appearance and soapy taste which an excess of soda gives.

Milk Biscuit.—Like soda; differ in shape only, being round.

English Soda.—One barrel of flour, 20 pounds of

lard, buttermilk sufficient to make a stiff dough, half pound of soda, dissolved in the buttermilk, 2 pounds of salt.

English Soda (No. 2).—One barrel of flour, 18 pounds of butter, half-pound bicarbonate of soda, 5 ounces muriatic acid, water or milk sufficient to make a stiff dough, say about 28 quarts. Add the acid, dissolved in a pint of water, after the dough is nearly made, pouring it over. Brake well, cut out square, and bake in a quick oven.

Butter Crackers.—One barrel of flour, 15 pounds of salt butter, 10 pounds of sweet lard, 2 pounds of salt, half pound of carb. ammonia, water sufficient, say 25 quarts. Dissolve the ammonia in about a quart of the water previous to mixing.

Lemon Crackers (Boston Lemon).—One barrel of flour, 37½ pounds of sugar, 25 quarts of water, 20 pounds of butter, 4 ounces essence of lemon, 18 ounces carb. ammonia dissolved in one quart of water. Make up as dry as possible, cut out, and bake in lively heat.

Oyster Crackers (No. 1.).—Oyster crackers may be made the same as soda. Cut with cutter, giving a small, rounded cracker.

Oyster Crackers (No. 2).—One barrel of flour, 20 pounds of salt butter, 8 ounces carb. ammonia dissolved in one quart of water, 25 quarts of water, more or less, to make tight dough, 1 pound of salt. Lard may be used instead of butter, in which case double the quantity of salt. The butter may be increased according to wish. Diminish the salt one ounce for every additional pound of butter used.

Lunch Biscuit.—One barrel of flour, 12 pounds of butter, 12 pounds of lard, 4½ pounds of granulated sugar, 14 quarts of milk and 14 quarts of water (more or less of each, to make pretty stiff dough), 7 ounces carbonate of soda, 5¼ ounces muriatic acid. Bake in moderately quick oven, about twenty minutes, until yellowish brown. They should be about three-sixteenths of an inch thick before baking. They may be

cut to any shape and called by any name which happens to be popular. This is the English way. The American method is much the same, only putting four ounces of cream tartar instead of the muriatic acid.

WINE BISCUIT.—The same as the preceding, only increasing the sugar. Make the sugar the same in quantity as the shortening.

PIC-NICS (No. 1).—One barrel of flour, 24 pounds of sugar, 24 pounds of butter, 24 quarts of milk (about), 20 ounces of carbonate of soda, 13 ounces of muriatic acid.

PIC-NICS (No. 2).—Same as No. 1. Substitute seven ounces cr. tartar for the muriatic acid.

PIC-NICS (No. 3).—One barrel of flour, 28 pounds of sugar, 10½ pounds of butter, 10½ pounds of lard, 4 pounds arrow root or farina, 14 ounces carbonate of soda, 14 quarts of buttermilk and 14 quarts of water (more or less of each, to make a moderately stiff dough). The butter or lard should be rubbed into the flour, the sugar dissolved in some of the water added, then the soda dissolved in some of the water, then mix again. Make a crumbly dough; brake, and roll out about one-eighth of an inch thick. Cut to shape, and bake light brown. Dry these after baking.

EGG CRACKERS (Cracknells), No. 1.—One barrel of flour, 16 pounds of granulated sugar, 12 pounds of butter, 3 gallons of eggs (broken), 6 quarts of milk, 12 ounces carb. ammonia.

(No. 2.)—One barrel of flour, 21 pounds of granulated sugar, 21 pounds of eggs, 7 gallons of eggs (broken), 7 quarts of milk, 14 ounces carb. ammonia.

(No. 3.)—One barrel of flour, 12 pounds of butter, 20 pounds of granulated sugar, 8 gallons of eggs (broken), 8 ounces of ammonia dissolved in 2 gallons of water. Rub the butter into the flour; make a bay; pour in the sugar, eggs, and milk, or water, if any, previously well beaten. The milk, or water, should

contain the ammonia dissolved in it. Make the whole into a dough, moderately tight. If too much so, the crackers will not curl or spring at the edges, which is considered one of the distinguishing features of this biscuit. Brake it well; let the dough be worked out very smooth; roll out about a quarter of an inch thick; dock over the surface, so that each biscuit will have five or six holes. Put them into wire trays, and as rapidly as the trays are filled, dip them into boiling water, face upward, one full minute. Take them and put them into cold water for two hours. Take them out and put upon sieves to drain, bottom upward. Bake in a moderate oven, leaving the oven door open about five minutes, which assists in making the edges curl up. Experience is required with these perhaps more than with any others. If not baked enough, they wrinkle on the surface; if too much, they lose their character as cracknells. Put in the drying room after baking.

Albert Biscuit.—One barrel of flour, 40 pounds of sugar, 20 pounds of butter, 15 pounds of sweet lard, 1½ pounds of corn starch, 1½ pounds of salt, 6 ounces of baking powder (or 4 ounces cream tartar and 2 ounces of soda), 25 quarts of milk (more or less). Moderately tight dough; brake out fine; roll thin, and bake in a lively oven to a light brown.

Fruit Biscuit.—One barrel of flour, 10 pounds of butter, 20 pounds of lard, 20 pounds of sugar, 25 quarts of water (more or less), 16 ounces carb. ammonia, 50 pounds of currants, picked and clean. Make the cracker first, all to baking; brake out thin, about an eighth of an inch. Pour a little hot water into the currants, to make them adhere, and spread on the sheet of dough. Put another sheet of dough on top, and run through the cutting machine the proper size.

ENGLISH BISCUITS MADE WITH YEAST.

Butter Biscuits.—Six pounds of flour, $\frac{3}{4}$ or 1 pound of butter, a quart of warm water, from $\frac{1}{2}$ to 1 ounce of German yeast, or a teacupful of brewer's yeast.

Rub the butter in with the flour, make a bay, pour in the water, and add the yeast, of which if it is brewer's yeast, and I do not know the quality of it, I usually add as much as will give the water a slight taste, so as to avoid their being bitter; but small beer yeast, or that which is the least bitter, should always be preferred. Mix the whole into dough, brake it a little, wrap it in a cloth or flannel, and set it in a warm place to prove. When it is light enough, brake it until it is quite smooth and clear, and if it is not tight enough add sufficient flour to make it so; roll it out into a sheet about an eighth of an inch in thickness, and cut out the biscuits with the docker.* Others cut the dough into strips and roll these out with the hand into a roll, when they cut it into pieces, which are flattened with the hand; each biscuit is then rolled and cut out separately, working in the cuttings each time with a fresh parcel of dough; as soon as the biscuits are cut out, bake them in a hot oven. A few persons make these without yeast, as a hard biscuit, using the same proportions for them, and the oven need not then be quite so warm. They are not usually dried after they are baked. These biscuits may also be made with soda and acid as directed for luncheon biscuits, and 2 lbs. of butter used when required very good.

Oliver Biscuits.—Four to 5 lbs. of flour, $\frac{1}{2}$ lb. of

*It may either be termed a docker or cutter, for properly it is both, being a piece of wood in the shape of other dockers having an iron rim or ring three inches and a half in diameter, with stout wires fixed in the wood, the same as for a captains' biscuit docker, but the points are not sharpened, and are level with the surface of the iron rim or ring.

butter, $1\frac{1}{4}$ pints of milk, and a little yeast, or about 1 oz. of German yeast.

Take one half of the milk; make it warm; add the yeast, with about a pound of the flour, so as to make a sponge, and put it in a warm place; when it has risen and fallen, rub the butter into the flour, add the remaining portion of the milk, warmed as before, which mix with the sponge, and make the whole into a dough; let it prove; roll it into thin sheets, and cut the biscuits out with a plain round cutter, nearly the same size as for butter biscuits, dock them or face them, and put several together in a heap, prick them with a fork or piece of wire over each surface—that is, first on the top, then turn them over and prick the opposite side, separate them, and place them in rows on dry tins; bake them in rather a slow oven. At some places in the west of England they are put on tins slightly buttered, the tops washed over with milk, when they are proved before being baked. These are the original Oliver or *Bath* Oliver Biscuits.

Another.—Four quarts of warm milk, to which add $\frac{3}{4}$ of a pint of well-washed brewer's yeast, and make into a sponge with flour. When the sponge is ready, pour in 2 lbs. of melted butter; mix well and make into a dough of moderate consistence with more flour. Let the dough prove a little, and then roll it out into thin sheets, cut the biscuits out with a plain round cutter; dock them with an old butter docker with the rim off. Face them, and put them in piles to prove a little; then separate them, put them on clean dry tins, wash the tops with milk, and bake in a cold oven.

Another.—Two lbs. of flour, 8 oz. of butter, 3 eggs, 1 drachm of carbonate of soda, and sufficient milk to make a dough of the consistence of the last.

Reading Biscuits.—These are a sprig or shoot from the last, and the method of making them has been considered by *a few* to be a very *great secret.* The preparations for them are, $\frac{1}{2}$ lb. of butter, 1 quart of warm water, a little yeast, with flour sufficient to make

the whole into a dough; make them as directed for Olivers, rolling them very thin, and using rather a smaller cutter. They are usually sold in boxes, and are much in request as a wine biscuit.

CAYENNE BISCUIT.—These are the same as the former, with the addition of cayenne pepper; the way in which it is added is very bad, as it gives some biscuits a greater portion than others, which cannot be avoided when the powder is mixed with the dough or flour. To obviate this use an infusion of cayenne in spirits of wine, which add to the water or milk, when they may be flavored equally, to any height required. Take the following proportions for it: 1 oz. of cayenne pepper, or capsicum berries, (or, if required very strong, 2 oz should be used), which steep for fourteen days in one pint of spirts of wine or good gin; put the whole into a bottle, and cork it close; use the clear liquor—a few drops will suffice.

These are sold in boxes, as the others, and are principally eaten with wine, after dinner, as a stimulant to excess.

NORWICH BISCUITS.—Six lbs. of flour, 8 or 12 oz. of butter, 1 quart of milk, with yeast. Some add 2 or 3 ounces of sugar, which may be omitted, as it is not necessary, neither is it in accordance with those biscuits made at the place from whence they take their name.

Prepare these as before directed for Olivers, and let the dough be of a moderately good consistence, nearly the same as for butter biscuits. When the dough is sufficiently proved, brake 18 or 20 biscuits out of a pound of dough, mould them into a round ball under your hands as you would rolls; place them on tins, slightly buttered, from 2 to 3 inches asunder; flatten them a little, and dock them in the center with a docker, the same as used for royal or cheese biscuits; prove them, and bake in rather a cool oven so as to admit of their being baked through, that they may eat short and crisp; if they should not be sufficiently

dried when taken out, finish drying them in the stove. At Norwich they are baked on the bottom of the oven.

These are a sort of biscuit which is made in many provincial towns in other forms, and under different names. At Exeter and the neighboring places, a similar preparation (viz., from 6 to 8 oz. of butter mixed with a quartern of bread dough, and made of a moderate consistence with flour) is cut into Fingers and Halfmoons, Fancy biscuits and Tea biscuits. The dough is rolled into a sheet about one-half an inch in thickness, and the fingers are cut out with a cutter about four inches long by three wide, which is divided into three parts, with two divisions lengthways, so that each biscuit is about an inch wide; the half-moons from a circular cutter, divided in two; and the tea biscuits are cut out into small hearts, diamonds, fingers, halfmoons, and other devices; these last are usually made richer than the others; they are all placed on tins so as not to touch each other, proved and baked as Norwich biscuits, without being docked.

The same preparation is also made and sold as milk biscuits for children and infants' food, with a medical gentleman's name attached; these have a less portion of butter, although they are advertised as being made without it; but I never knew an instance in which they were so made.

Cheltenham Biscuits.—These are the same as the last, with the addition of 6 or 8 oz. of loaf sugar to the quart of milk. Make them as Norwich biscuits, but roll them flatter, or so as they will be about one-halt an inch in thickness, dock them in the center with rather a larger docker, place them on tins slightly buttered, prove, bake, and dry them well. A similar biscuit to these has recently been made under the title of the Queen's Nursery biscuit; or the following preparation may be used:

Nursery Biscuits.—One quart of milk, from 4 to 6 oz. of butter, 2 oz. of sugar, about 5 lbs. of flour, and sufficient yeast to work it.

Take half or three parts of the milk, warm it, and set a sponge with patent or brewer's yeast, and some of the flour. When the sponge is ready add to it the rest of the milk, warmed as before. Rub the butter in with the remainder of the flour, and make the whole into a dough of moderately good consistence, rather more so than bun dough. Set it aside in a warm place to prove, and make into cakes as directed for Norwich biscuits, only a little larger. Prove them well, and bake in a slow oven, of a delicately pale brown, and dry them in the stove when baked.

They may be made into cakes as follows, instead of the preceding. Roll the dough into sheets from a quarter to half an inch in thickness, and cut it into cakes with a plain round cutter about three inches in diameter; dock them in the center and finish as before.

Half an ounce of soda may be added to each quart of milk in the sponge. This addition may suit some infants by correcting acidity of the stomach, and be an improvement to the biscuits when patent yeast is used.

Waterloo Biscuits.—To 4½ lbs. of bread dough add 6 oz. of butter melted, 8 oz. of sugar, 2 oz. of caraway seeds, and ½ oz. of pure volatile salt finely pounded. Mix well, using flour to dust it with in the working; let it prove, and proceed as for the last. This makes an excellent biscuit for infants' food.

SOFT BISCUITS.

Rout Biscuits.—Three lbs. of flour, 6 oz. of butter, 1¼ lb. of loaf sugar in powder, ½ pint of milk, ¼ oz. of volatile salts pounded fine, and a little essence of lemon.

Put the sugar and volatile salts in the milk, and let them stand for an hour or two, stirring occasionally.

VOCABULARY OF TERMS IN BAKING.

BAY BOARD.—The board to divide the trough.

BIN.—A large chest in which to mix the flour.

BRAKE—To knead (a term in cracker baking).

COLLANDER.—A tin vessel with a perforated bottom, used to strain the ferment, &c.

DOUGH.—The manipulation next after the sponge.

FERMENT.—The first stage in making bread. A preparation of yeast, potatoes and flour.

GRISINI.—Italian bread.

GREASE BRUSH.—A brush used to spread lard on the surface of tins; also used to cover the surfaces of French bread before "proving" them.

MASH TUB.—The tub in which the ferment is worked.

OVEN.—A brick chamber heated, in which the bread is baked.

PEEL.—A piece of thin board, to which is attached a handle long enough to reach to the back of the oven.

PROVING.—To increase the volume.

PIN (*rolling*).—Used to cut through French bread.

SWAB.—A piece of sacking slung to a stout pole with which to clean the oven bottom.

SPONGE.—The second stage in the preparation of bread, consisting of the strained ferment, more water, and sufficient flour to make it into fair consistency.

TROUGH.—A wooden tub in which the sponge and dough are mixed.

YEAST.—A ferment action of hops, flour and sugar, seasoned with salt and worked with the addition of yeast of a previous baking.

Another Method.—One lb. of sugar, a teacupful of milk or water, 4 oz. of butter, ½ oz. of volatile salts.

Put the sugar and milk in a clean saucepan over the fire, let them boil up; see if all the sugar is dissolved; if not, give it another boil or two, and set it aside to cool; it will be ready for use when cold.

Rub the butter in with the flour, make a bay, pour in the sugar, and make the whole into a dough of a moderate stiffness. In the last recipe, the volatile salts should be pounded and mixed with the sugar after it is boiled, and sufficient flour should be used to make a dough of a good consistence, keeping it in a loose state until it is nearly of the size or consistence required; then work it together. Take a part of the dough, mould it in a square piece, and lay it over the impressions or figures carved in a block of wood, and press it in; keep your hand firm on it, that it may retain its place; have a thin knife, which is made for this purpose, called a toy knife, rub it over a damp cloth, or pass it through flour; lay it flat on the block, and cut off the superfluous dough; take the biscuits out and place them on tins slightly buttered, so as not to touch each other; wash them over lightly with milk, and bake them in a very hot oven. The last mixture is the best for persons who are not very expert in the cutting. The dough is apt to get tough if worked or moulded too much, when made according to the first recipe, an error which inexperienced persons are very liable to commit.

In cutting the biscuits observe that the pressure of the hand on the dough must be equal on every part of the impressions or figures carved in the wood, or the biscuits will not be of an equal thickness.

TAXIDERMY.

PART FIRST.

Of Skinning, Preparing and Mounting the Mammalia, or Quadrupeds.

OF SKINNING.

WHEN a quadruped is killed, and its skin intended for stuffing, the preparatory steps are to lay the animal on its back, and plug up its nostrils, mouth, and any wounds it may have received, with cotton or tow, to prevent the blood from disfiguring the skin. A longitudinal incision is then made in the lower part of the belly, in front of the pubis, and extended from thence to the stomach, or higher if necessary, keeping in as straight a line as possible, and taking care not to penetrate so deep as to cut into the abdominal muscles. In some instances, the incision is made as high as the collar bone. In this operation the hairs must be carefully separated to the right and left, and none of them cut, if possible. The skin is also turned back to the right and left, putting pads of cotton or tow between it and the muscles, as the skinning is proceeded with. If any fatty or oily substance should be noticed, it must be carefully wiped away. The skin being removed as far in every direction as the extent of the incision will admit of, each of the thighs must be separated at its junction with the pelvis, that is, by the head or ball of the *Os femoris*,* or thigh bone. The intestinal canal is then cut across, a little way above the anus, and then the tail is separated, as close to the animal as possible. After this the pelvis is pulled out of the skin, and the skin separated from the back by inserting the handle of the scalpel cutting knife between it and the carcase. It is pulled gradually upward until the operator reaches the shoulders. The whole hinder parts and trunk of the body being thus out of the skin, the next operation is to remove the fore-legs, by separating them from the body at the shoulder-joint, or the base of the *Os humeri*. When the joint of one shoulder has been separated from the body, the leg is again put into the skin, and the animal then turned

* Those who are unacquainted with the names of the different bones of the skeleton, will find a full detail of those of both quadrupeds and birds, in our description of fig 1. [See pages 8 and 9.]

in order to repeat the same with the other side, the limb of which is also returned. The skin is then removed from the neck. The next thing is to separate the skin from the head by the assistance of the scalpel. It is taken off as far as the point of the nose ; while great care must be taken not to injure the eyelids, and to cut the ears as close to the skull as possible ; and also to avoid cutting the lips too close.

All this having been performed, the head and trunk of the animal are completely separated from the skin. The next operation is to remove the head of the animal from the trunk, at the upper bone of the vertebræ. The external muscles of the head and face are then carefully cut off with a scalpel, and the bones left as free from flesh as possible. The occipital bones are next enlarged by means of a strong knife, or other instrument ; and the brain all carefully removed. The fore legs are now pulled out of the skin, by drawing the legs one way and the skin another, as far as the claws of the foot. All the muscles are then cut off the bones, while care is taken not to injure the ligaments and tendons. They should be left adhering to the knee. They are then returned into the skin again. The hind legs are treated in the same manner. The tail is the last part which is skinned, and this is a more difficult task than the other parts of the body. Two or three of the

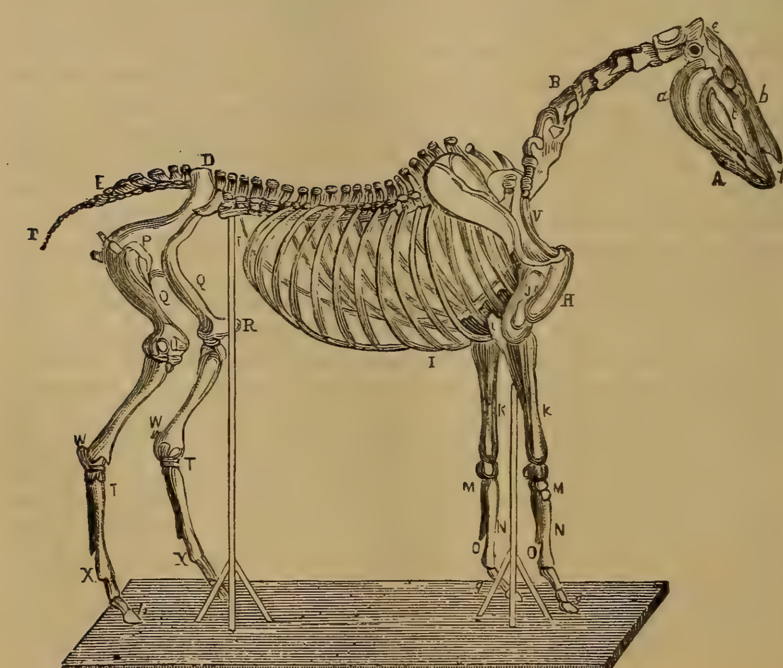

Fig. 1.—*Skeleton of the Horse.*

first joints or vertebræ are first laid bare by pulling the skin back ; they are then tied firmly with a strong cord, which must be attached to a strong nail or hook on the wall. A cleft stick is introduced between the vertebræ and the skin, the stick is then forced to the extremity, and the tail bones come out of their enveloping skin or sheath.

The skeleton head, having been divested of all its fleshy matter, tongue, palate, external muscle and brain is now returned to its place in the skin, which is in a condition for commencing the operation of stuffing.

OF STUFFING QUADRUPEDS, &c.

Let us suppose the animal which we intend to stuff to be a cat. Wire of such a thickness is chosen as will support the animal by being introduced under the soles of the feet, and running it through each of the four legs. A piece of smaller dimensions is then taken, measuring about two feet, for the purpose of forming, what is termed by stuffers, a tail bearer. This piece of wire is bent at nearly a third of its length, into an oval of about six inches in length ; the two ends are twisted together, so as to leave one of them somewhat longer than the other ; the tail is then correctly measured, and the wire is cut to the length of it, besides the oval. The wire is then wrapped round with flax in a spiral form, which must be increased in thickness as it approaches the oval, so as to be nearly equal to the dimensions of the largest vertebræ, or root of the tail. The thickness can be very nearly imitated from

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EXPLANATION OF FIG. 1.—A, the head; a, the Posterior Maxillary or jaw bone; b, the Superior Maxillary, or upper jaw; c, the orbit of the eye; d, the nasal bones, or bones of the nose ; e, the Suture, dividing the parietal bones below from the occipital bones above; f, the Inferior Maxillary bone, containing the upper incisors, or cutting teeth; B, the seven Cervical Vertebræ, or bones of the neck; C, the eighteen Dorsal Vertebræ, or bones of the back; D, the six Lumbar Vertebræ, or bones of the loins; E the five Sacral Vertebræ, or bones of the haunch; F, the Caudal Vertebræ, or bones of the tail, the usual number being fifteen; sometimes, however, they vary; G, the Scapula, or shoulder blade; H, the Sternum, fore part of the chest or breast-bone ; I, the Costæ, or ribs, seven or eight of which articulating with the Sternum, are called the *true ribs*, and the remaining ten, or eleven, which are united together by cartilage, are called the *false ribs*; J, the Humerus, or bone of the arm; K, the Radius, or bone of the fore arm; L, the Ulna, or elbow; with its process, the Olecranon; M, M, the Carpus, or knee, consisting of seven bones; N, N, the Metacarpal, or shank bones. The large Metacarpal, or cannon, or shank in front; and the smaller Metacarpal, or splent bone behind; g, the fore pastern and foot, consisting of the Os Suffraginis, or the upper and longer pastern bone, with the sesamoid bones behind, articulating with the cannon and greater pastern: the Os Coronæ, or lesser pastern ; the Os Pedis, or coffin bone; and the Os Naviculæ, or navicular shuttle bone, not seen, and articulating with the smaller pastern and coffin bones; h, the corresponding bones of the hind feet; O, O, the small Metacarpal, or splent bones; P, the Pelvis, or haunch, consisting of three portions,—the Ilium, the Ischium, and the Pubis ; Q, the Os Femoris, or thigh-bone ; R, R, the Patella placed on the stifle joint; S S, the Tibia and Fibula; the latter is a small bone behind. These are also called the ham bones; T, T, the bones of the Tarsus, or hock, six in number; U, U, the Metatarsals of the hind leg, called shank, or cannon bones W, W, the Os Calcis, or point of the hock ; X, X, X, X, the Sesamoid, or fetlock bones.

measuring the bones of the tail which have just been removed and for this purpose a pair of calipers should be used. When finished it should be rubbed thinly over with flour paste, to preserve its smooth form, which must be allowed to dry thoroughly, and then the surface should receive a coating of the preservative. The sheath of the tail must now be rubbed inside with the preservative. This is applied with a small quantity of lint, attached to the end of a wire, long enough to reach the point of the tail sheath. The tail bearer is then inserted into the sheath, and the oval part of the wire placed within the skin of the belly, and attached to the longitudinal wire, which is substituted for the vertebræ or back bone.

Four pieces of wire, about the thickness of a crow quill, are then taken, which must be the length of the legs, and another piece a foot or fifteen inches longer than the body. One end of each of these is sharpened with a file in a triangular shape, so that it may the more easily penetrate the parts. At the blunt end of the longest piece a ring is formed, large enough to admit of the point of a finger entering it; this is done by bending the wire back on itself a turn and a half, by the assistance of the round pincers. On the same wire another ring is formed in a similar manner, consisting of one entire turn, and so situated as to reach just between the animal's shoulders. The measurement should be carefully made from the animal itself. The remaining part of this wire should be perfectly straight, and triangularly pointed at the extremity.

Another method of forming the supporting wires, as practiced by M. Nicholas, is to take a central wire, which must be the length of the head, neck, body and tail of the cat, as in fig. 2; that is, from *a* to *b*, ; two other pieces are then taken and twisted round the center piece in the manner represented in fig. 2, *c*, *d*, *e*, *f*; these extremities being left for

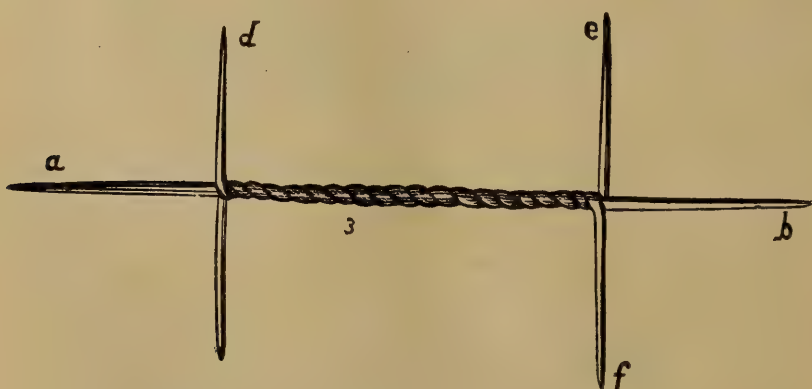


Fig. 2.—The Wires Prepared for Insertion.

the leg wires. After the wires are thus twisted together, the central one is pulled out; and the feet wires of one side are pushed through the legs of one side from the inside of the skin, and the other two leg pieces are bent and also forced through the legs, and afterward made straight by a pair of pincers ; the center piece, having been previously sharpened at one end with a file, is now forced through the forehead and down the neck till it enters the center of the twisted leg wires which it formerly occupied, and pushed forward to the extremity of the tail, leaving a small piece projecting out of the forehead, as represented in the cat, fig. 3. After which the completion of the stuffing is proceeded with.

We think this mode unnecessary for the smaller animals, and that it should only be adopted for quadrupeds the size of deer, &c. These wires are besides much more difficult to insert by this than by the other method.

All the wires being adjusted, the operation of stuffing is next proceeded with. The skin of the cat is now extended on a table, and the end of the nose seized with the left hand,

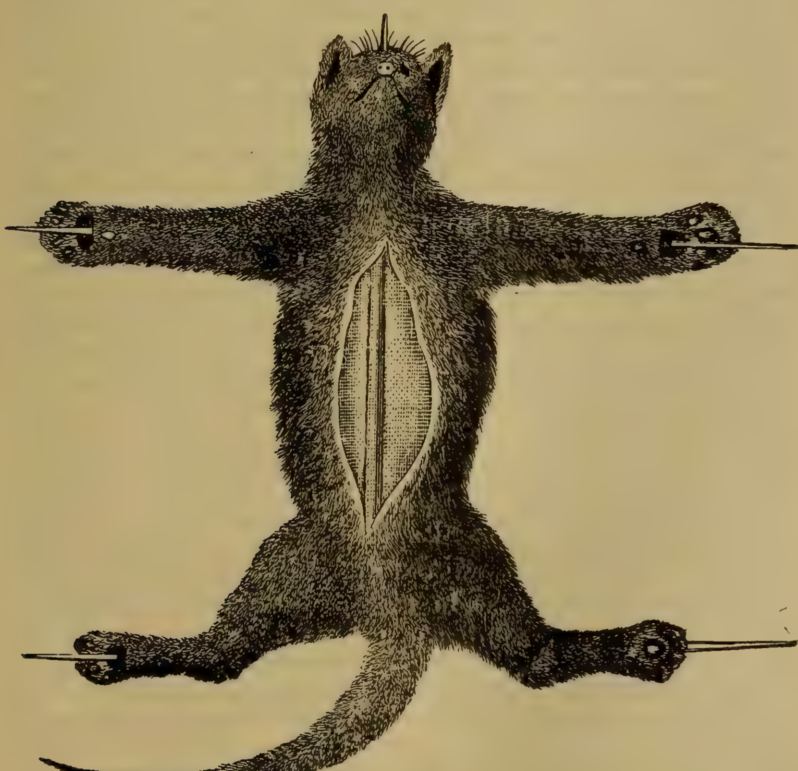


Fig. 3.—The Wires Inserted in the Cat.

and pushed again into the skin, till it reaches the neck, when we receive the bones of the head into the right hand. The skull is now well rubbed over with the arsenical soap, and all the cavities which the muscles before occupied are filled with chopped tow, flax or cotton, well mixed with preserving powder. The long piece of wire is now passed into the middle of the skull, and after it is well rubbed over with the preserva ive, it is returned into the skin. The inner surface of the neck skin is now anointed, and stuffed with chopped flax, taking care not to distend it too much. Nothing like pressure should be applied, as the fresh skin is susceptible of much expansion.

Observe that it is always the inner surface which is anointed with the arsenical soap.

Take care taht the first ring of the wire, which passes into the head, is in the direction of the shoulders, and the second corresponding with the pelvis, or somewhat toward the posterior part. One of the fore-leg wires is then inserted along the back of the bone; and the point passed out under the highest ball of the paw. When this is accomplished, the bones of the leg are drawn up within the skin of the body, and the wire fastened to the bones of the arm and fore-arm with strong thread or small twine. Brass wire, used for pianoforte strings, makes it more secure, and is not liable to rot. These are well anointed, and flax or tow slivers wrapped round them, so as to supply the place of the muscles which have been removed. The common stuffing employed by the French taxidermists, at the Jardin des Plantes, is chopped flax; but it must be quite evident that for such parts as the legs of animals or birds, that flax or tow slivers are far preferable; and can be wound on with more nicety. Whereas, chopped flax or tow is apt to make inequalities. To give the natural rise to the larger muscles, a piece of sliver should be cut of the length of the protuberance required, and placed in the part, and the sliver wrapped over it. This gives it a very natural appearance.

The mode of fixing the legs, is by passing one of their pieces of wire into the small ring of the horizontal or middle supporting wire. Pursue the same plan with the other leg, and then twist the two ends firmly together, by the aid of a pair of flat pincers. For an animal of the size of a cat, the pieces left for twisting must be from five to six inches in length. After being twisted, they are bound on the under side of the body wire, with strong thread; the two legs are then replaced and put in the form in which we intend to fix them. The skin of the belly and top of the shoulders is then anointed; and a thick layer of flax placed under the middle wire. The shape is now given to the scapulæ on both sides, and all the muscles of the shoulders imitated. These will be elevated or de-

pressed, according to the action intended to be expressed. The anterior part of the opening is now sewed up, to retain the stuffing, and to enable us to complete the formation of the shoulders and junction of the neck. This part of the animal is of great importance, as regards the perfection of its form; and much of its beauty will depend upon this being well executed.

If the animal has been recently skinned, the best plan possible is to imitate, as nearly as possible, the muscles of the carcass; by which many parts will be noticed which might otherwise have been neglected. Even to the comparative anatomist, I address this recommendation: copy nature whenever you have it in your power.

It must be observed as a general rule, that the wires for the hind legs of quadrupeds should always be longer than those of the fore legs.

The next thing is to form the hind legs and thighs, which must be done, as above described for the fore legs; but with this difference, that they must be wound round with thread, drawn through the stuffing at intervals, to prevent it slipping up when returned into the skin of the leg. They are then fixed by passing the leg-wires into the second ring of the center body-wire, which is situated at or near the pelvis; the two ends are then bent, twisting them to the right and left around the ring; and to make them still more secure, they should be wound round with small brass wire or packthread; the tail-bearer is then attached in the manner formerly described.

Having completed this part of the iron work, the skin of the thigh is coated inside with the preservative, and the stuffing completed with chopped flax or tow. The whole inner parts of the skin which can be reached are again anointed, and the body stuffing completed with chopped flax. Care must be also paid not to stuff the belly too much, as the skin very easily dilates. The incision of the belly is now closed by bringing the skin together, and then sewed within and without; while attention is paid to divide the hairs, and not to take any of them in along with the thread; but should any of them be inadvertently fixed, they can be picked out easily with the point, fig. 20. When this is completed, the hair will resume its natural order, and completely conceal the same.

The seam should now be well primed on both sides with the solution of corrosive sublimate, to prevent the entrance of moths.

The articulations of the legs are then bent, and the animal placed on its feet; and pressure used at the natural flat places, so as to make the other parts rise where the muscles are visible.

I cannot take leave of this part without mentioning a plan which I invented, for giving full effect to the muscles of the

shoulders. Having skinned a dog, immediately on removing the carcass, I took a plaster-of-paris cast from each of the shoulders; and from these molds I cast a pair of shoulders. After having completed the internal stuffing, I applied these casts to the top of the tow, and on the skin being brought over them, they had the best effect imaginable; and gave the complete appearance of the shoulder in the living animal. This method may be extended to the other visible muscles of the body with great effect; and it is very easily and speedily accomplished. In short, every legitimate means of this kind should be thought of and adopted, at whatever expense and trouble it may be, to obtain the end in view; namely, as close an imitation of the living subject as possible; for one well mounted specimen is worth fifty indifferently executed.

A board is now prepared, on which to place the cat. But before fixing it permanently, the animal should be set in the attitude in which it is intended to be preserved, and the operator having satisfied himself, then pierces four holes for the admission of the feet wires, which must be drawn through with a pair of pincers till the paws rest firmly on the board. Small grooves are then made for the reception of the pieces of wires which have been drawn through, so that they may be folded back and pressed down in them, and not be beyond the level of the back of the board; wire nails are now driven half in, and their heads bent down on the wires to prevent them from getting loose, or becoming movable.

The stuffer next directs his attention to the position and final stuffing of the head and neck. The muscles of the face must be imitated as correctly as possible, by stuffing in cotton at the opening of the eyes, as also at the mouth, ears, and nostrils. To aid in this also, the inner materials may be drawn forward by the assistance of instruments, such as are represented in figs 19 and 20, and also small pieces of wood formed like small knitting meshes.

Our next care is in the insertion of the eyes, which must be done while the eyelids are yet fresh. Some dexterity and skill are required in this operation; and on it will depend most of the beauty and character of the head. The seats of the eyes are supplied with a little cement, the eyes put in their place, and the eyelids properly drawn over the eyeballs; but if rage or fear are to be expressed, a considerable portion of the eyeballs must be exposed. The lips are afterward disposed in their natural state, and fastened with pins. If the mouth is intended to be open, it will be necessary to support the lips with cotton, which can be removed when they are dry. Two small balls of cotton, firmly pressed together, and well tinctured with the arsenical soap, must be thrust into the nostrils, so as to completely plug them up, to prevent the air from penetrating, as also the intrusion of moths; and besides it has the

effect of preserving the natural shape of the nose after it has dried. The same precaution should be adopted with the ears, which, in the cat, require but little attention in setting.

We must again recommend the stuffer to see that he has sufficiently applied the preservative soap ; and the nose, lips, ears, and paws, being very liable to decay, must be well imbued with spirits of turpentine. This is applied with a brush, and must be repeated six or eight times, at intervals of some days, until we are certain of the parts being well primed with it ; and, after all, it will be advisable to give it a single coating of the solution of corrosive sublimate.

The methods of stuffing, which we have pointed out in the preceding pages, are applicable to all animals, from a lion down to the smallest mouse. Animals of a large description, require a frame-work suited to their dimensions ; these we will point out in their systematic order. There are also some animals, whose peculiarity of structure requires treatment differing a little from the ordinary course.

APES AND MONKEYS.

One of the chief difficulties to contend with, in setting up monkeys and apes, is the preservation of their hands, and hind hands, or what are commonly called their feet ; because we must not attempt to deprive these limbs of their flesh, as we never could again supply its place, anything like what it is in nature. The hand must therefore be dried, and then well imbued with turpentine, and the solution of corrosive sublimate, repeated eight or ten times at least, at intervals of four or five days. The other parts of the stuffing should be exactly similar to that recommended for quadrupeds generally. The paws of several will require to be colored with the different varnishes, and, when dry, slightly polished with fine sand paper to remove the gloss. The callosities, on the hinder parts of many of them, will also require to be colored and treated in the same way as the face.

BATS.

The wing membranes of this varied and numerous tribe do not require either wire or parchment to set them. They are very easily dried by distention. They are laid on a board of soft wood, the wings extended and pinned equally at the articulations, and when dry they are removed from the board.

THE FLYING LEMUR

Has a large flexible membrane, which envelopes the feet and extremities, and even the fingers and tail. This membrane should be laid open from within, and the preservative plentifully supplied to it, and then dried. Wires are afterward

introduced to keep the different parts distended, but we have found that by introducing buckram or stiff parchment, they are much more natural and pliable. They are to be stuffed and mounted as other quadrupeds.

HEDGEHOGS.

When it is wished to preserve hedgehogs rolled into a ball, which is a very common position with them in a state of nature, there should be much less stuffing put into them than is usual with quadrupeds, so that they may the more easily bend. No wires are required in this case. The head and feet are drawn close together under the belly; then place the animal on its back in the middle of a large cloth, and tie the four ends firmly together; suspend it in the air till thoroughly dry, which finishes the operation.

If hedgehogs are wished, with the head and limbs exposed, the usual method of mounting is adopted. The skins of mice, moles, &c., having a very offensive smell, it will be necessary to add a considerable portion of the tincture of musk, to the solution of the corrosive sublimate, with which the skins are imbued. The same applies to badgers, foxes, wolves, wolverines, polecats and skunks, all of which are strong smelling animals.

BEARS.

The structure of the wires requires to be different in these larger animals from any we have before described.

Procure a bar of wood one inch thick, two inches broad, and as long as to reach from the shoulders to the connection of the thighs, or *Os pubis.* A hole is bored four inches distant from one of its ends, from which a connecting groove must be formed, extending on both sides to the end of the plank next the hole; this groove must be cut out with a hollow chisel, deep enough to receive the wire. The wire is then passed through it, one end of which is just left long enough to be twisted with the other at the end of the plank. The wire on both sides is now pressed down into the groove, and twisted firmly together by the aid of a pair of strong pincers. Pierce some holes obliquely into the groove, and insert some wire nails into them, which must be firmly driven home, and then bent over the wires to keep them firm. The longest end of the wire should be at least eighteen inches beyond the bar, so as to pass through the skull of the animal.

The use of this bar, it will be observed, is as a substitute for the central or supporting wires of the body. Two other holes are now bored into it, the one two, and the other three inches from the end which we first pierced; these are for the reception of the wires of the fore-legs, and two similar holes must

be made at the other extremity of the bar for receiving the wires of the hind legs.

Bears always support themselves on the full expansion of their dilated paws, so that it is necessary to bring the leg wires out at the claws. The leg wires are bent at right angles, for a length of five inches from the upper end. These are put through the holes in the bar, and when they have passed through they are curved again. Two small gimlet holes are then made for the reception of smaller wire, by which the leg wires must be bound together close to the bar. The fore-leg wires are fixed in the same manner, which completes the framework.

This seems to be the most simple manner which could be devised, for obtaining the end in view, and is that practiced at the Laboratory of the Jardin des Plantes at Paris. No other means are used for middle sized animals, such as the lion, tiger, leopard, &c. The stuffing is completed as in other quadrupeds.

The walrus, seals, and other amphibious animals of this order, are treated in the manner of quadrupeds generally, only that leg wires are unnecessary, except in the fore feet; the tail, which represents the hind feet, has merely to be dried and kept properly stretched during this process, which precaution also applies to the fore feet. They are the easiest stuffed of all animals, only the skins are very oily, they should be well rubbed with the arsenical soap, and also with the preserving powder.

The stuffing of the walrus, the sea elephant and other large animals of this family, should consist of well dried hay for the interior parts and tow for the surface next the skin.

OPOSSUM, &c.

The females of the kangaroo, opossum, &c., have abdominal pouches in which they carry their young, and others have membranes which project from their sides. In drying the pouches, they require to be well primed with the preservative, and attention must be paid to show them properly in the stuffed animal. The membranes should be kept out by buckram or strong parchment as before recommended in the flying lemur.

BEAVER, &c.

The beaver, muskrat, common rat and other animals whose skins have a strong smell, require to be plentifully supplied with the preservative. The tail of the beaver should be cut underneath, and all the flesh removed, then stuffed with tow or chopped flax, and afterward thoroughly dried and well primed with the arsenical soap to prevent putrefaction, to

which it is very liable. It should also have repeated washings with oil of turpentine. The back should be round and short.

THE PORCUPINE.

In stuffing this animal considerable and varied expression may be given, both from the attitude and disposition of the quills. Great attention is therefore required in giving these a proper set during the process of drying. They will require to be looked at several times during the first and second day after they have been stuffed, and any of them that may have fallen out of position required to be adjusted.

HARES AND RABBITS

A very pretty attitude for the hare or rabbit is to have it seated in an upright position, as if alarmed at the noise of dogs, &c. An oval is formed of wire and attached to the interior frame work, after having passed one end of it through the anus, which must be passed through a hole in the board on which the animal is to be fixed. The wires of the hind legs must be forced through the posterior part of them, and also fixed into holes formed for their reception in the board.

THE SLOTH.

Must be mounted in an upright posture, as they are seldom or never to be seen walking horizontally, except in finding their way from one tree to another. The great length of their fur makes it a comparatively easy task to mount them.

ARMADILOES

Are also easily set up, owing to the bands preserving the ordinary shape of the animal. The French taxidermists do not use any of the preservative for the skin, but merely dry it. We are, however, of opinion, that they are wrong, as all sorts of hides are liable to the attacks of insects, unless preserved in some way. We would, therefore, recommend the use of arsenical soap as in other skins.

ANT-EATERS.

The great ant-eater has a long prehensile tail, with long flowing hairs. The tail must be supported by a much longer tail-bearer than that of other quadrupeds generally. The tongue is very long and protractile, and ought to be drawn out of the mouth as if in the act of catching ants.

THE ELEPHANT.

Various methods have been devised for the mounting and stuffing of elephants. The best plan is that which was

adopted, with the elegant specimen now in the Jardin du Roi, at Paris.

The dead elephant being extended on the ground, the dimensions were all taken, and correctly noted at the time. M. Lassaigne, cabinet-maker to the establishment, invented a large rule for that purpose, which was somewhat like a shoemaker's size-stick. The different curves of the back, belly, neck, &c., were taken by bars of lead of three-quarters of an inch in thickness. This metal is much better adapted than any other for that and similar purposes, as it has no elasticity, it retains any shape into which it is put.

M. Demoulins made a drawing of the animal from these measurements, on the wall of a workshop where the model was constructed of its natural size.

The elephant was placed upon its back by means of four-corded pulleys fastened to the platform. An incision, the form of a double cross, was then made in the lower side, the central line reaching from the mouth to the anus; the two other cuts were made from the left leg on both sides to the opposite right legs. The trunk was longitudinally opened in its under side; the soles of the feet were now taken out to within an inch of their edge, and the nails allowed to remain attached to the skin—this was effected by the aid of chisel and mallet, and was one of the most difficult operations of the whole.

Several persons worked at a time at the operation of skinning, and four days were necessary to effect it. When removed from the carcass, the skin was weighed, and found to be *five hundred and seventy-six pounds.*

It was extended on the ground, so that, the cutaneous muscles of the head and other parts might be cut away from its interior. The skin was then put into a tub, and covered six inches deep with water which had been saturated with alum.

The model which was to fill the skin was made as perfect as possible in its shape. To insure this, models were made of half the head in plaster, as also a fore and hind leg. This structure was made of linden-wood, and so ingeniously constructed by M. Lassaigne, that almost the whole parts could be separated. He opened a pannel on one side of the body, whereby he introduced himself into its interior, so that he might make its parts more perfect within. Even the head and proboscis were hollow, which rendered this stupendous model so light that it could be moved from one part to another with comparative ease.

The model being completed, the alum water in which the skin had been all the time immersed, was now taken out and made boiling hot, and in that state poured on the skin, which was then allowed to soak in the warm liquor for an hour and

a half, when it was taken out still warm and placed upon the model, which they accomplished with some difficulty. But judge of their mortification when it was found that the model was rather too large. To diminish the wood-work they foresaw would run the risk of putting its parts out of proportion. It then occurred to them, that the best thing to be done under these awkward circumstances, was to take off the skin again and reduce its thickness with knives; they removed all the internal thicknings which came in their way. In this operation five men were occupied for four days, during which time they cut out one hundred and ninety-four pounds weight off the internal surface. During this process the skin had dried, and required again to be immersed in cold soft water; after allowing it to remain twenty-four hours to soak, it was then put on the model and found now to cover it completely; the edges were brought together, and secured with wire nails deeply driven home, and large brads. Except at the edges, the nails and brads were only driven in half way to keep the skin down to the different sinuosities and hollows until dry, when they were again all pulled out.

The alum with which the water was saturated gave the skin an ugly gray appearance, in consequence of its becoming crystalized. But this was soon remedied, by first rubbing the skin with spirits of turpentine, and afterward with olive oil.

By the admirable and well executed contrivance here adopted, a specimen has been mounted with all the appearance of life, which, with a little attention, may resist for ages the influence of time's destroying hand. It is the only specimen of an elephant in Europe worth looking at, all others being great misshapen masses, completely devoid of all appearance of nature.

The rhinoceros, tapir, horse, and its congeners, should all be mounted in the same manner. At the Jardin du Roi, a fine specimen of the quagga has been mounted in this way. At the Jardin des Plantes, Paris, the giraffe is mounted in the same way as the elephant; as are also some of the larger antelopes.

DEER, ANTELOPES, GOATS, &c.

These animals should be mounted on the same principles as recommended for bears. A different mode must, however, be adopted in skinning the animals, which the horns render necessary. It is performed in the ordinary manner until the operator reaches the neck. After cutting as near the head as possible, another incision must be made, commencing under the chin, which is continued to the bottom of the neck, or from eight to ten inches in length. By this opening, the remainder of the neck is separated from the head; the tongue is cut out, and the occipital orifice enlarged, and the brain

extracted thereby. The lips are now cut as near as possible to the jaw-bones, and the operator must continue progressively ascending toward the forehead, and in this manner all the skin will be separated from the head, except at the nose, or point of the muzzle. All the muscles are next removed by the scalpel, and the skull well anointed with arsenical soap. The muscles which have been cut out are then imitated with chopped flax or cotton, which may be attached to the bones with cement. When this is done, the head must be replaced within the skin. The orifice under the neck must now be sewed up with fine stitches, so that the hair may spread over them to conceal the seam. The other parts of the mounting are completed as directed for the bear.

THE ELK

Being an animal of stupendous size, should be mounted on a model the same as the elephant.

Some of the smaller species of antelopes may be put up in the same manner as the cat, but using stronger wires.

THE URUS, BISON, BUFFALO,

And other large animals, to be mounted in the same manner as the elephant. But their skins should be deeply imbued with turpentine.

THE DOLPHIN, PORPOISE, &c.

The structure of these animals, as well as of the other species of the first family of this order, differs but little in general structure.

In skinning these, an incision is made under the chin, and continued to the extremity of the tail ; the skin is then detached right and left with the scalpel, or a sharp knife. When the skin has been cut back as far as possible, disengage the vetebræ at the tail, and this will enable the operator to detach the skin from the back ; the vetebræ are now cut close to the head, and the whole carcass removed.

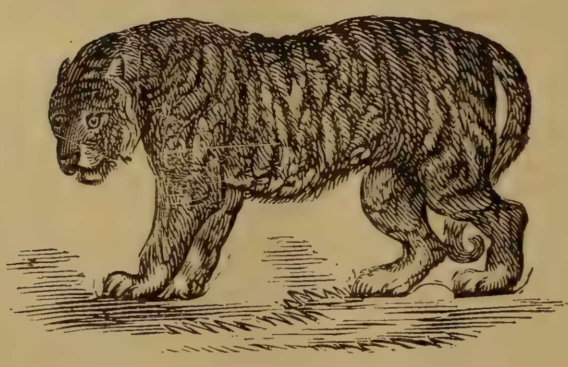
All this tribe have a thick layer of fat under their skin. In the operation of skinning it requires considerable dexterity to leave this fat, or blubber, adhering to the carcass. Practice alone will give this skill. When this has not been properly managed in the skinning, the only thing to be done afterward is to scrape it thoroughly with a knife. The oil which flows from it during the operation, must be soaked up with bran, or plaster-of-paris.

There being no muscular projections in the skin of the porpoise, there is no use for wires in mounting it. A narrow piece of wood the length of the body is quite sufficient to keep the skin stretched, and stuffed either with tow or hay, Some

months are necessary to render it perfectly dry and stiff, from its greasy nature. The grease almost always leaves some disagreeable looking spots on the skin. To remove these, and prevent a recurrence of them, powdered pumice-stone steeped in olive oil, is rubbed thickly on the skin with a hand-brush. It is then gone over a second time with emery and oil. It is rubbed in this way till the skin has a glossy appearance, when it may be rubbed dry with a woolen cloth ; and to complete the polish, a clean woolen cloth may be applied with some force to complete the gloss, which is natural to the skin in a living state.

Where a very glossy appearance is wished, varnishes become necessary, but some difficulty has been experienced in getting these to remain attached to the skin in all weathers, because the humidity of rainy seasons melts gum-arabic when it is used as a varnish, and when white varnish is applied, both it and the gum Arabic fall off in pieces. To prevent the gum from falling off in this way, by its contracting, the solution should have about an eighth part of ox-gall mixed with it, and the surface of any body to be varnished should be washed with ox-gall and water before the varnish is applied, which will, almost to a certainty, prevent it from cracking and falling off. It must, however, be thoroughly dried before the varnish is applied.

We may here state, that an animal the size of a fox or a cat, may be skinned, prepared, and finally set up, in the space of four or five hours, by a person who has had a little practice in the art of Taxidermy, and that from ten to fifteen minutes are all that will be required to skin an animal of the size just mentioned.



PART SECOND.

Of the Skinning, Stuffing and Preservation of Birds.

OF SKINNING.

IMMEDIATELY after a bird is killed, the throat and nostrils should be stuffed with tow, cotton, or fine rags, and a small quantity wound round the bill, to prevent the blood from staining the plumage ; but should any get on the feathers, notwithstanding this precaution, the sooner it is removed the better, which should be effected by a sponge which has been merely moistened in water. Too much dispatch cannot be used in removing the skin, if the bird is shot in a warm climate ; but, in temperate regions, the bird may be allowed to cool.

In proceeding to skin the bird, it should be laid on its back, and the feathers of the breast separated to the right and left, when a broad interval will be discovered, reaching from the top to the bottom of the breast bone. (See fig. 4, for manner of separating the feathers, and using the scalpel.) A sharp pen-knife or scalpel must be inserted at the point of the bone, and cut the outer skin from thence to the vent, taking care not to penetrate so deep as the flesh, or upon the inner skin which covers the intestines. The skin will then easily be separated from the flesh in larger specimens by the

Fig. 4.—Manner of Holding the Hands while Skinning a Bird.

fingers, or in smaller ones by passing a small blunt instrument betwixt the skin and body, such as the end of the scalpel handle; with this you may reach the back. The thighs should now be pressed inward, as in the common method of skinning a rabbit, and the skin turned back so far as to enable you to separate the legs from the body at the knee joint. The skin is then pulled downward as low as the rump, which is cut close by the insertion of the tail, as shown at fig. 5, but in such a manner as not to injure its feathers. The skin is

Fig. 5.—Bird Suspended by One Limb for Skinning.

now drawn upward the length of the wings, the bones of which must also be cut at the shoulder joints (*a*, fig. 6); it is then pulled up till all the back part of the skull is laid bare, when the vertebræ of the neck are separated from the head, from *b* in fig. 6; and the whole body is now separated from the skin. You next proceed to remove the brain through the opening of the skull, for which purpose it may be enlarged by a hollow chisel or other iron instrument. The eyes must then be

taken out by breaking the slender bones, which separate the orbits from the top of the mouth, in which you may be assisted by pressing the eyes gently inward so as not to break them. In skinning the neck, great care must be taken not to enlarge the opening of the ears, and not to injure the eyelids. The whole of the flesh is next to be removed from the under mandible.

Several species will not admit of the skin being thus pulled over their heads from the smallness of their necks; some woodpeckers, ducks, coots, &c., fall under this description; in which case a longitudinal incision is made under the throat, so as to admit of the head being turned out, which must be neatly sewed up before stuffing. The flesh from the head, wings, legs and rump must then be carefully removed with a knife or scalpel, and the cavities of the skull filled with cotton or tow. The whole inside of the skin, head, etc., must be well rubbed with arsenical soap or preserving powder, or

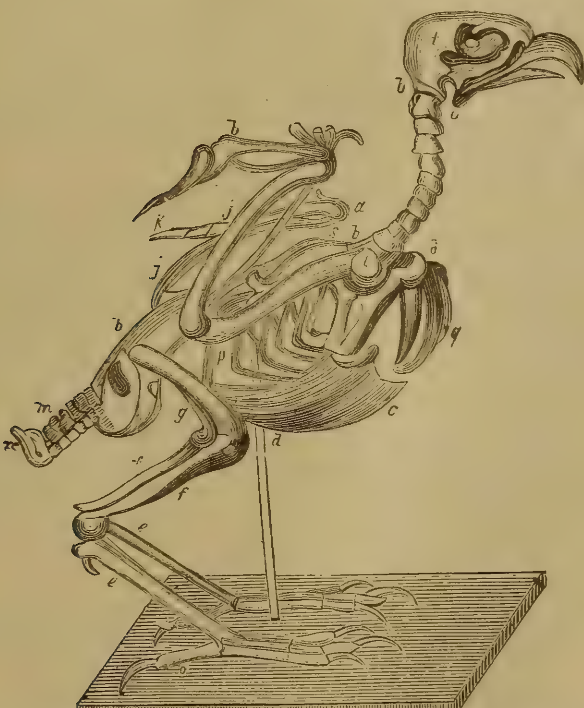


Fig. 6.—Skeleton of Goshawk, supported by a small Iron Rod.

Description of Bones shown in Fig. 6.—a, ball of the Ulna; b, b, b, the vertebræ of the neck, or cervical vertebra; c and d, the Sternum; e, e, the Tarsus; f, f, the Fibula; g, the Tibia; h, h, the metacarpul bones; i, j, the Ulna; m, the Pelvis; n, the Os Coccygis; q, the Clavicle; s, Vertebræ of the back; t, the Os Humeri.

spirits of turpentine, or the solution of corrosive sublimate. When it is wished to stuff the bird, it may now be immediately done, as it will easily dry if in a warm climate ; but in low damp countries it will require artificial heat to do it effectually.

When the skins are merely wished preserved, the bones of the legs and wings should be wrapped round with cotton or tow, so as to supply the place of the flesh ; the skin is then inverted and hung up to dry after using the arsenical soap, as above directed ; before doing which, in larger birds, a thread or small string may be drawn through the rump and passed up the inside of the neck, and drawn through the bill, to prevent the head stretching too much by its own weight. In larger specimens, where cotton or tow is not easily to be met with, well dried hay may be used.

The incision for removing the skin is frequently made under the wings. This may be done with marine birds to advantage. The penguins and divers may be skinned by making the incision in the back.

The tongue should either be kept in the mouth or sent home separately with the birds.

The greatest care must be taken to prevent the fat and oily matter, so common to sea birds from getting on the feathers, pounded chalk will be found an excellent absorbent for applying to these birds.

In sending home specimens of birds, they should be each wrapped in paper, and closely packed in a box, and camphor, preserving powder, and strong aromatics, strewed among them to prevent them from being attacked by insects ; and they ought to be kept in a very dry part of the vessel.

It is of the utmost consequence to know the color of the eyes and legs of birds, and these things should be carefully noted the moment they are killed ; and it should also be mentioned whether they are male or female ; such a memorandum ought to be attached to the birds by a ticket. The season of the year in which the bird is killed must also be mentioned. It is also of much consequence to have good skeletons, and for this purpose the carcass may be sent home in a barrel, either in spirits or a strong solution of salt and water.

MANNER OF SKINNING BIRDS AS PRACTICED AT THE JARDIN DES PLANTES, PARIS.

First, a needle full of thread is passed across the nostrils, and tied under the lower mandible. A little cotton is introduced into the mouth, and every care taken that neither blood nor oily matter is allowed to soil the feathers of the head, as it is no easy matter to remove it from that part.

The bird is laid on a table on its back, and the feet from you, with the head placed toward your left hand. The fea-

thers of the breast and belly are then divided right and left with a pair of forceps, and the down which covers the belly is pulled off. An incision is then made in the skin with the scalpel from the upper edge of the sternum, or breast bone (fig. 6, *c*), until you reach the middle of the belly (fig. 6, *d*). The skin of one side is then lifted with the forceps, and separated from the muscles of the breast by the point and end of the scalpel, used alternately until you reach as near as possible the wings. Having accomplished this, a small quantity of cotton, dusted over with flour or powdered whitening, is placed on the flesh to prevent the skin from adhering to it. The thighs are then forced forward, and cut through between the femur and tibia (fig. 6, *e* and *f*) ; the femur is then returned to its place in the skin. You then separate the skin from the rump by the use of the scalpel and the fingers, this part being left to support the feathers of the tail. The part of the carcass which is now denuded of its skin is taken into the left hand, and the skin separated from the sides, in which operation small scissors are used for cutting any of the tendons which may be met with. The wings are now separated from the trunk by the end of the *Os humeri* (fig. 6, *g*), and again pushed back into their place. The neck and head are skinned as we have described at page 24, and the same method formerly pointed out is employed in removing the brain, while cotton and flax are applied and any moisture absorbed by means of plaster-of-paris or dry earth, which prevent the feathers from adhering.

The wings are now removed, properly cleaned of their flesh, and restored to their place, after being rubbed with arsenical soap and dusted with the preserving powder. The flesh is removed from the thighs, the bones being carefully preserved and restored to their proper places, after being treated in the same manner as the thighs.

In the larger species of birds all the muscles and fatty matter which adhere to the skin are carefully cut off. Any gun shot holes in the skin are next sewed up from within ; a piece of thread is then attached to the first joint of both wings, and they are by means of it drawn together to such a distance as they may be supposed to have been apart when the muscles were on the body. This gives the wings a set, so that when the bird is stuffed they naturally fall into the proper place and position, if the bird is in a quiescent posture.

When birds are of a large size, take a piece of cord a yard long, one end of which should be made fast to a large hook or nail in the wall, from which the bird should be suspended, then with a running noose fastened round one of the thighs, as represented in fig. 5, the bird is suspended in such a manner as enables it to be turned in any direction without injury. The resistance afforded assists greatly in the operation of skinning.

The insides of the wings should have an incision made in them, and as much flesh taken away as possible, and some preserving powder introduced ; a little tow or oakum should be put lightly in to fill the skin, but not to extend it. If the bird is large, hay may be substituted for the above. The feathers must now be placed smooth, the wings laid in their natural position closed, and the subject put in a clean dry place, and exposed to the air for a few days till all moisture has evaporated from it ; after which the stuffing may be withdrawn, and many skins may be packed flat on each other.

If the feet are large and fleshy, as in some of the gulls, geese, eagles, &c., an incision should be made along the sole of each foot, so as to expose the muscles to the action of the air, and also a quantity of preserving powder applied to it, otherwise they run every risk of becoming putrid and rotten. This latter precaution is not required in small birds, in which the small quantity of cotton, that is put into them while drying, may be retained, unless the traveler is restricted for want of room, in which case they may be packed quite flat.

Mr. Salt, while in Abyssinia, packed his bird-skins between sheets of paper, in the same manner as a herbarium, and they reached this country in perfect safety, and made excellent specimens when set up. In warm climates, the boxes should be well closed, and the seams filled with warm pitch, on the outside, to prevent the intrusion of insects ; and the inside should be supplied with camphor, musk, or tobacco-dust, which will prevent the attacks of the smaller insects.

Till practice has given facility to the operator, it will assist in keeping the feathers clean, if, as he opens the skin of the breast, he pins pieces of paper or linen cloth on the outside ; but, after a few trials, this will be unnecessary.

Some of the marine fowls are so fat, that there is much trouble in separating it from the skin, and, in warm weather, great attention will be required to prevent it from running on the feathers. As much as possible should be scraped off, in the first place, with a blunt table-knife or pallet-knife, and a quantity of powdered chalk applied to absorb what remains, which, when saturated with the oily matter, should be scraped off, and a fresh supply used ; after which, a much larger proportion of the preserving powder should be applied than in other birds which are not fat.

When shooting on the seacoast, if the ornitholgist is not provided with these requisites for absorbing the oil, which flows quickly from any wounds of the skin, he will find dry sand a tolerable substitute.

If, however, after every precaution, the oily matter should get on the feathers, the sooner it is removed the better, as in birds where the plumage is white, if it is allowed to become hardened, it will produce a very disagreeable appearance ;

and, besides, render that part particularly liable to the attack of insects. There are several effectual methods of removing the greasy stains; the first, safest, and best, is, by taking a quantity of diluted ox-gall—or where it cannot be commanded, sheep's gall, or that of any other animal—mix it with about double the quantity of water, and apply it with a sponge to the place which the fatty matter has touched, when it will immediately remove it. The next is by using a solution of salt of tartar, or potash, or soda. This must be made very weak, not exceeding half a tea-spoonful to a cup of water; which will have the same effect as the gall. Whichever of these are used, the place must be immediately afterward washed with pure water, so as to leave none of the gall or alkaline substance remaining. The gall has a gummy tendency, and will glue together the fibers of the feathers; and besides it has a great attraction for moisture, and in humid weather will become damp, and therefore produce mold; the other alkaline substances must also be used with much caution and quickness, because they have the power of changing the colors of the plumage, so that they are most useful in white plumage, and therefore should only be used on colored feathers, where gall cannot be procured.

One general observation applies to the preservation of all animal skins, which is, they must be made perfectly dry, so that the sooner they are exposed to a free current of air the better; and unless they are speedily and thoroughly dried, the skin will become putrid and rotten, and the hair or feathers will consequently fall off. If a skin is properly dried soon after it is killed, it will keep a considerable time without any preservative whatever, only it will be the more liable to be attacked by insects afterward.

The following excellent general directions for skinning, are given by Mr. Waterton: "While dissecting, it will be of use to keep in mind that in taking off the skin from the body by means of your fingers and little knife, you must try to shove it in lieu of pulling it, lest you stretch it.

"That you must press as lightly as possible on the bird, and every now and then take a view of it, to see that the feathers, &c., are all right.

"That when you come to the head, you must take care that the body of the skin rest on your knee; for if you allow it to dangle from your hand, its own weight will stretch it too much.

"That throughout the whole operation, as fast as you detach the skin from the body, you must put cotton immedately betwixt the body and it, and this will effectually prevent any fat, blood, or moisture, from coming in contact with the plumage.

"As you can seldom get a bird without shooting it, a line

or two on this head will be necessary. If the bird be still alive, press it hard with your finger and thumb just behind the wings, and it will soon expire. Carry it by the legs, and then the body being reversed, the blood cannot escape down the plumage and through the shot holes. As blood will have often issued out before you have laid hold of the bird, find out the shot-holes by dividing the feathers with your fingers, and blowing on them ; and then, with your pen-knife or the leaf of a tree, carefully remove the clotted blood, and put a little cotton on the hole. If, after all, the plumage has not escaped the marks of blood, or if it has imbibed slime from the ground, wash the part in water without soap, and keep gently agitating the feathers with your fingers till they are quite dry. Were you to wash them, and leave them to dry by themselves, they would have a very mean and shriveled appearance.

"In the act of skinning a bird, you must either have it upon a table or upon your knee, probably you will prefer your knee, because, when you cross one knee over the other and have the bird upon the uppermost, you can raise it to your eye or lower it at pleasure by means of the foot on the ground ; and then your knee will always move in unison with your body, by which much stooping will be avoided and fatigue prevented."

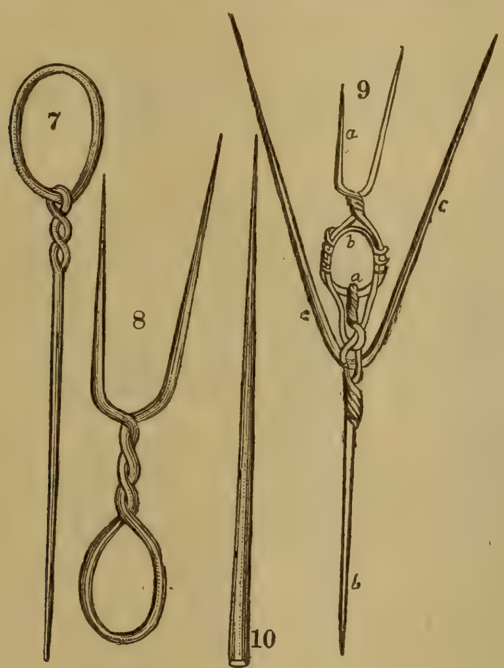
ON STUFFING BIRDS.

The first thing to be done in stuffing is to replace the skull, after it has been well anointed with the arsenical soap, and washed with the solution of corrosive sublimate inside. The thread with which the beak is tied, is taken hold of by the left hand, and the head is repassed into the neck with the forefinger of the right hand, while the thread is pulled on the opposite side ; and we are careful that the feathers, at the margin of the opening, do not enter with the edges of the skin. The bird is now laid on the table, with the head turned toward the left hand ; and the legs and wings adjusted to their proper situation. A flat piece of lead, about a pound in weight, is laid on the tail, while the feathers of the margins of the opening are raised by the forefinger and thumb of the left hand, to prevent their being soiled. The inside of the neck is now coated with the arsenical soap ; flax is stuffed into it, but not too tightly. The back and rump are anointed, and the body should then be stuffed with tow, to about a third of the thickness required, so that the wire may have a sort of cushion to rest on.

Four pieces of wire are then prepared of a thickness proportionate to the size of the bird to be stuffed. The center piece should be somewhat longer than the body of the bird. At about a fourth of its length a small ring is formed, by the as-

sistance of the round pincers, or plyers, fig. 14, and the other end is pointed with a file. This wire is oiled and introduced across the skull, and passed into the neck, through the center of the flax or tow with which it is stuffed, the ring being situated toward the anterior part of the skull, for the purpose of receiving the points of each of the wires that are passed through the feet and thighs.

The following is the method by which this perforation is effected. A hole is bored with a common bradawl of the caliber of the wire which it is intended to use. The wire, which is to continue in the leg, is passed across the knee, and



*Figs. 7 to 10.—Wires used for Birds.**

brought out interiorly, and placing it into the ring above mentioned ; the same operation is performed on the other side. The extremities of the wires of the legs, and the end of the central wire beyond the ring, are all twisted together with flat pincers, and then bent toward the tail. The tail-bearer is next formed, which consists of the fourth piece of wire, with which an oval is formed, by twisting the two ends two or three turns, so that they may form a kind of fork, with the oval

DESCRIPTION OF FIGS. 7 TO 10. -Fig. 7. The oval and head wires of a bird separated. Fig. 8. The tail-bearers separated. Fig. 9. The body-wire, the head wire, the tail-bearer and legs connected. Fig. 10. A leg-wire separated.

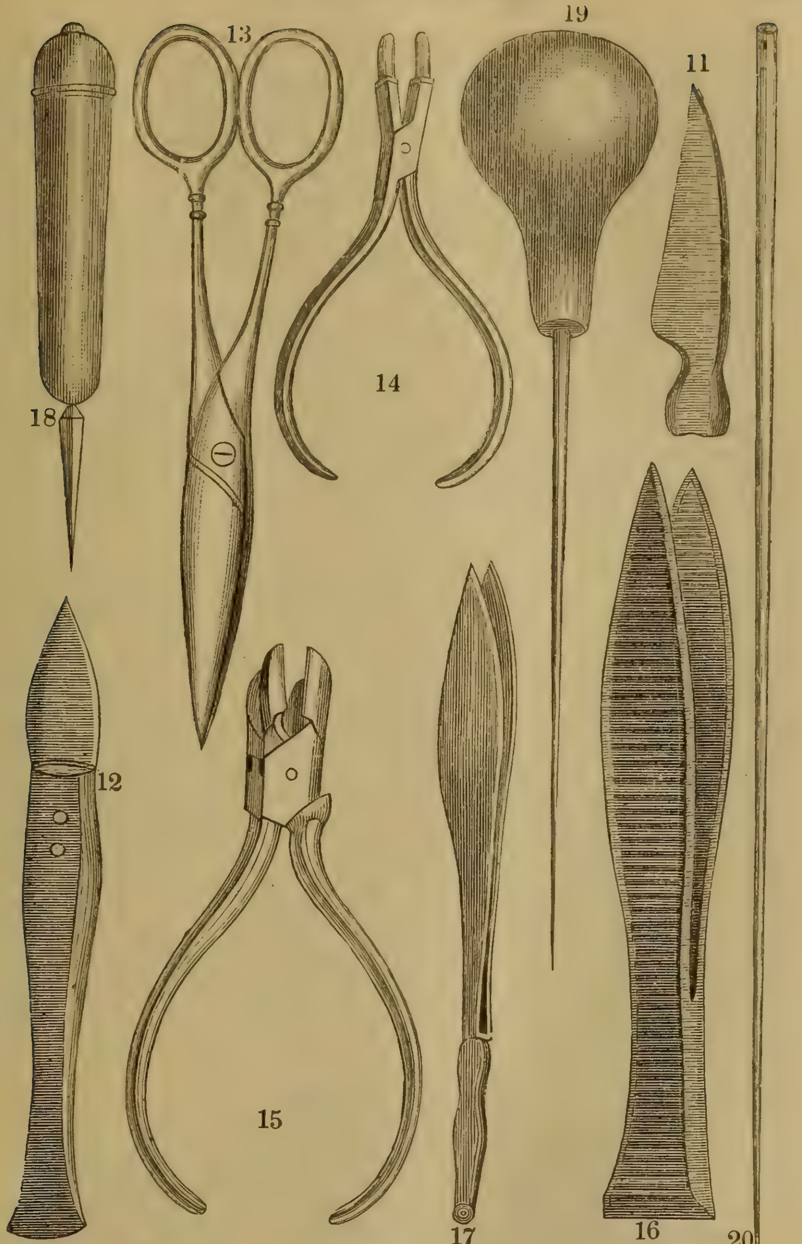
nearly the length of the body of the bird; the two points of the fork must be sharpened with a file, and near enough to enable them to enter the rump, through which they must pass, and their points will be concealed by the rectrics, or large straight, tail-feathers, while the oval is within the body of the bird. If the bird is large, the tail-bearer must be firmly attached to the interior wires, by twisting a small wire several times round both. But unless the birds be large, it may remain quite free. The several wires are shown in figs. 7, 8, 9 and 10.

All the parts of the skin at which we can come must be thoroughly rubbed with the preserving soap, the rump in particular, which should besides be soaked with the solution of corrosive sublimate. The stuffing is now proceeded with, by inserting chopped flax or tow, till it has attained its proper dimensions. The skin is brought together and sewed up while we take the greatest care to separate the feathers at every stitch.

The orbits of the eyes are next finished, by inserting with small spring forceps and a short stuffing stick, a small quantity of chopped cotton, while attention is paid to round the eyelids properly. The glass eyes are now inserted, taking care to place them properly under the eyelids. But, before fixing the eye, a little calcareous cement must be used, to prevent them from coming out. If any part of the nictitating membrane is visible below, it must be pushed up with a steel point.

The wire frame-work, above described, is the most simple of any in its construction, and is better adapted for small than large birds. Indeed, it will hardly suit those of the larger species. The following is another method of constructing the frame-work, which may be used either in large or small birds:

Like the former it is constructed of four pieces of wire. The center piece should be double the length of the bird; it is bent at a third of its length of an oval form, and twisted two turns, the shortest end being passed into the oval, and then raised against the longer end, so as to produce a ring at the end outside of the oval, large enough to admit the two wires which pass from the feet to the inside of the bird. It is now twisted a second time, and firmly united to the longer end, which ought to be straight, with a sharp point, effected by means of a file. As before directed, it is rubbed with oil, and forced through the stuffing of the neck. It ought to be so constructed by measurement, that the oval part of the wire shall be in the center of the body inside. The wires of the feet and legs, as before directed, ought to be straight and pointed, and passed through the soles of the feet as before. When the point has penetrated, the other end of the wire



Figs. 11 *to* 20.—*Various Implements used by the Taxidermist.*

Description of Figs. 11 to 20.—Fig. 11. Blade of a scalpel for separating the skin of quadrupeds, birds, &c. Fig. 12. Blade and handle of a differently shaped scalpel. Fig. 13. A pair of scissors used in skinning, &c. Fig. 14. Round pincers. Fig 15. Cutting pincers for wire. Fig. 16. Pair of large forceps. Fig. 17. Pair of small forceps. Fig. 18. A triangular bodkin or awl. Fig. 19. Circular bodkin. Fig. 20. Probing-needle.

may be bent, so that by means of it we may be able to assist in forcing up the remainder of the wire. The two internal ends of the foot-wires are twisted together, and curved within, so as to pass through the small circle or ring of the middle branch above the oval, to each side of which they are now attached with a piece of small string.

The tail-bearer is constructed on the same principle, and attached in the same manner as before described, and the latter apparatus is introduced after the neck and back are finished in the stuffing.

This practice of introducing the neck-wire, after the neck is stuffed, was first adopted at the Jardin des Plantes at Paris, and is now invariably adopted in that establishment in preference to introducing it before the neck is stuffed. The neck of a swan or other long-necked and large birds, are even done so. It is unquestionably the best plan which has hitherto been discovered, as it preserves the cylindrical shape of the neck.

MR. BULLOCK'S METHOD OF STUFFING BIRDS.

Mr. Bullock, of the London Museum, Egyptian Hall, had another method of arranging the wires, which, after what we have already said, will be easily comprehended by a reference to fig. 21, where we have given a figure of his mode. After the skin is taken off and prepared, different sized, annealed iron-wires are procured according to the size of the bird they are to support. The skin is laid on its back without stretching it ; cut two pieces of wire, the one rather longer than the bird, and the other shorter, so as not to reach to the head of the bird ; twist them together, sharpen the end of the longer by means of a file, and pass one end through the rump, and the other through the crown of the head, near the base of the bill. Care must be taken not to extend the neck beyond its ordinary length,—a very common fault in most preservers. Lay a little tow along the back of the skin for the wire to rest on, then take two other pieces of strong wire and file them to

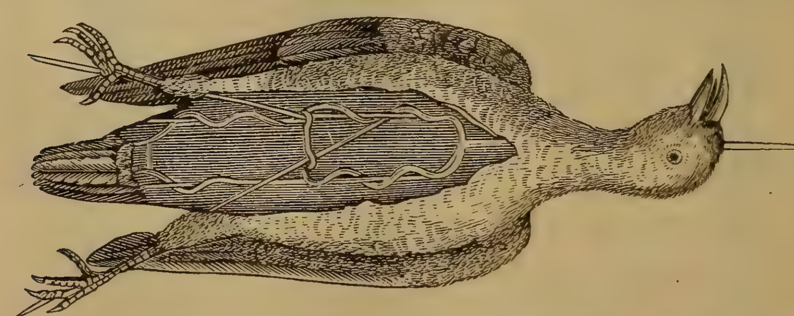


Fig. 21.—Mr. Bullock's method of inserting Wires in setting up Bird.

a point at one end; these are passed through the soles of the feet and up the center of the leg-bone, or tarsus. When within the body, they are to be fastened to the first wires by twisting them together, which, when accomplished, may be supposed to represent the back-bone. The wire should be left two or three inches out of the soles of the feet, to fasten them in a standing position, as before directed. Two smaller wires are then passed through the wings, as in the legs, and afterward fastened to the back-wires a little higher up than the leg-wires, taking care that no part of the skin is extended beyond its natural position.

MR. BECŒUR'S METHOD OF STUFFING BIRDS.

Becœur, the best apothecary in Metz of his day, the inventor of that truly useful preservative, the arsenical soap, had a method of prepaing birds peculiar to himself, which he successfully practiced. He stuffed recent specimens in very high perfection. And in support of the fact that they were well preserved, many specimens preserved by his own hand, still enrich the cabinets of France, and these were set up sixty-five years ago.

A little attention and practice will enable any one to follow his method. He skinned his bird in the ordinary manner, extracting the body without cutting any of the extremities. The muscular parts were then cut away by a scalpel, while every endeavor was made to preserve all the ligaments. He then anointed the skin with the arsenical soap, and also the skeleton, and then returned it to its place within the skin, and carefully disposed of the feathers on either side. He formed a ring on a piece of iron wire at nearly a third of the length of the wire, and passed this wire through the head; the smallest side passed into the rump in such a manner, that the iron ring came under the sternum; a leg-wire was then passed through each leg, so that the ends of them united to pass into the little ring in the middle of the back-bone, where they were secured with a string. The flesh of the muscles was replaced by flax, or chopped cotton; and when he had satisfied himself with the form, it was then sewed up, placed on a foot-board or support of wood where he gave it the attitude intended, of which he was always certain, for a bird mounted in this manner can only be placed in a natural attitude.

Becœur mounted quadrupeds in the same manner, and with equal success.

M. MAUGE'S METHOD OF STUFFING BIRDS.

This naturalist had a method of preparation and stuffing of which he was the inventor, and which he practiced with con-

siderable success. It was as follows :—(The bird is supposed to be a small one.)

He took two pieces of wire, in length and thickness required for the bird he was about to stuff. One of these was somewhat longer than the other. The longer piece he pointed at both ends with a file, and the shorter piece at one end only. One end of each wire was held under the fore-finger and thumb of the left hand ; he then twisted the other parts five or six times round, about three-quarters of an inch from the point of the other wire with the finger and thumb of the right hand, leaving an untwisted space large enough for a finger to pass through ; he now twisted it four or five times more, leaving a second space untwisted for the purpose of passing the feet-wire through, and also of producing a triangular form with the first interval he had left untwisted, the smaller opening being one turn above the triangle.

The wires for the feet were straight, and pointed at one end in the ordinary form. When the head and neck were stuffed, he introduced the long end of the center wire through the neck and skull, and the other extremity which was forked, and passed it across the rump to support the tail feathers. He then forced up one of the leg-wires, and brought the end of it through the small hole which was situated above the triangle, and then gave it an inclination toward the opposite parts, and united the two with threads ; the same method was then adopted with the other leg.

For larger birds, M. Mauge substituted the oval for the triangle.

We shall now describe the new method invented by the ingenious Mr. Waterton.

MR. WATERTON'S METHOD OF STUFFING BIRDS.

"You will observe," says Mr. Waterton, "how beautifully the feathers of a bird are arranged, one falling over the other in the nicest order ; and that, where this charming harmony is interrupted, the defect, though not noticed by an ordinary spectator, will appear immediately to the eye of a naturalist. Thus, a bird not wounded, and in perfect feather, must be procured if possible, for the loss of the feathers can seldom be made good ; and where the deficiency is great, all the skill of the artist will avail him little in his attempt to conceal the defect, because in order to hide it, he must contract the skin, bring down the upper feathers and shove in the lower ones, which would throw all the surrounding parts into contortion.

"You will observe, that the whole skin does not produce feathers, and that it is very tender where the feathers do not grow. The bare parts are admirably formed for expansion about the throat and stomach, and they fit into the different cavities of the body at the wings, shoulders, rump and thighs,

with wonderful exactness ; so that in stuffing the bird, if you make an even rotund surface of the skin where these cavities existed, in lieu of re-forming them, all symmetry, order and proportion are lost forever.

"You must lay it down as an absolute rule, that the bird is to be entirely skinned, otherwise you can never succeed in forming a true and pleasing specimen.

"You will allow this to be just, after reflecting a moment on the nature of the fleshy parts and tendons, which are often left in : 1st, They require to be well seasoned with aromatic spices ; 2dly, They must be put into the oven to dry ; 3dly, The heat of the fire and the natural tendency all cured flesh has to shrink and become hard, render the flesh withered, distorted and too small ; 4thly, The inside then becomes like a ham or any other dried meat ; ere long the insects claim it as their own, the feathers begin to drop off, and you have the hideous spectacle of death in ragged plumage.

"Wire is of no manner of use, but on the contrary a great nuisance, for where it is introduced a disagreeable stiffness and derangement of symmetry follow.

"The head and neck can be placed in any attitude, the body supported, the wings closed, extended or elevated, the tail depressed, raised or expanded, the thighs set horizontal or oblique, without any aid from wire. Cotton will effect all this.

"A very small proportion of the skull bone, say, from the forepart of the eyes to the bill, is to be left in, though even this is not absolutely necessary. Part of the wing-bones, the jaw-bones, and half of the thigh-bones remain ; everything else, flesh, fat, eyes, bones, brains and tendons, are all to be taken away.

"Introduce the cotton for an artificial body by means of a little stick like a knitting needle, and without any other aid or substance than that of this little stick and cotton, your own genius must produce those swellings and cavities, that just proportion, that elegance and harmony of the whole so much admired in animated nature, so little attended to in preserved specimens. After you have introduced the cotton, sew up the orifice you originally made in the belly, beginning at the vent. And from time to time, till you arrive at the last stitch, keep adding a little cotton, in order that there may be no deficiency there. Lastly, dip your stick into the solution, and put it down the throat three or four times, in order that every part may receive it.

"When the head and neck are filled with cotton quite to your liking, close the bill as in nature. A little bit of bees wax at the point of it will keep the mandibles in their proper place. A needle must be stuck into the lower mandible perpendicularly ; you will shortly see the use of it. Bring also

the feet together by a pin, and then run a thread through the knees, by which you may draw them to each other as near as you judge proper. Nothing now remains but to add the eyes; with your little stick make a hollow in the cotton within the orbit and introduce the glass eyes into it. Adjust the orbit to them as in nature, and that requires no other fastener."

Great attention must be paid to the size of the orbit, which will receive within it an object much larger than the eye, so that it must be drawn together with a very small delicate needle and thread, at the part farthest from the beak.

A small quantity of the solution is now applied to the bill, orbits, and feet.

Take any ordinary box large enough for holding the bird, andfill with cotton three-fourths of it from the top at one end, and the other end forming an inclined plane; make a hollow in it sufficient for the reception of the bird, place it in the box with its legs in a sitting posture; take a piece of cork into which three pins have been stuck for legs, like a three-footed stool; place it under the bill of the bird, and the needle which was formerly run through the bill is stuck into the cork, which will act as a support to the bird's head. If the neck is wished to be lengthened put more cotton under the cork, or *vice versa*; and if the head is wished to be projecting forward, it has only to be brought nearer the front of the box, humoring the cork, so as to place it in the position require.

As the back part of the neck shrinks more in drying than the fore part, a thread must be tied to the end of the box, and fastened to the beak, to prevent the face from looking too much upward. If the wings are wished elevated, support them with cotton; and if to be very high, place a piece of stick under them.

Should you desire to expand the wings, the order of the feathers must be reversed, commencing with the two middle ones. When perfectly dry, place them in the natural order, and they will ever afterward continue as you wish them. If the crest is wished to be erect, the feathers must be moved in a contrary direction for a day or two, when they will soon take the position wished for.

The box must now be placed out of the reach of the sun, air, or fire, so that the skin may dry slowly. The corrosive sublimate is of much service in this respect, for it renders the skin moist and flexible for many days. The bird should be lifted every day, so that any faults may be corrected which take place while drying.

The small wing-coverts are apt to rise, owing to the skin coming in contact with the wing-bones. The part which rises should be gently pulled with the finger and thumb for a day or two, and the feathers pressed down.

The feathers should be frequently adjusted so as to render them distinct and visible.

The legs begin to stiffen in three or four days, when it will be time to place them in the desired position ; and the toes either arranged or curved, so as to hold a branch, in which two spikes must be placed for the reception of the feet, whereon they are to be stuck, and can afterward be removed at pleasure. All the threads which kept the different parts in their places may now be removed.

Mr. Waterton touches the whole feathers with the solution of corrosive sublimate, so as to preserve them from the attack of moths. He says, "The surest way of proceeding is to immerse the bird in the solution of corrosive sublimate, and then dry it before you begin to dissect it."

THE SIMPLEST METHOD OF BIRD SKINNING AND STUFFING.

A fair specimen being obtained, take common cotton wadding, and with an ordinary paint-brush stick plug the throat, nostrils, and in large birds the ears with it, so that when the skin is turned no juices may flow and spoil the feathers ; you must then provide yourself with the following articles : A common pen-knife ; a pair of cutting plyers ; a pair of strong scissors, of a moderate size ; a button hook ; a narrow spoon ; and a hand vice. With these, a needle and thread, and a sharpener of some kind, to give your knife an occasional touch, you are prepared so far as implements go. Then provide yourself with annealed iron wire of various sizes ; some you may buy ready for use, some not ; but you can anneal it yourself by making it red hot in the fire, and letting it cool in the air. Common hemp is the next article, cotton wadding, pounded chalk or whitening, and pounded alum or chloride of lime ; as to the poisons which are used, they will be spoken of by and by. You should also have a common bradawl or two, and some pieces of quarter inch pine, wheron to stand the specimens when preserved, if to be placed as walking on a plane ; if not, small pieces of twigs or small branches of trees should be kept ready for use, of various sizes according to the size of the bird ; something of the form seen in fig. 22. Cedar, or common laurel, cut in December, will serve best, but this must be regulated by fancy and

Fig. 22.—Branch for Mounting a Bird.

the requirements of the case ; oak boughs are sometimes of a good shape. Detailed instructions for mounting birds will be further on in this book.

The best time for preserving specimens is in spring, because then the cock birds are in the best feather, and the weather is not too warm. In mild weather three days is a good time to keep a bird, as then the skin will part from the flesh easily. If a specimen has bled much over the feathers, so as to damage them, wash them carefully but thoroughly with warm water and a sponge, and immediately cover them with powdered whitening, which will adhere to them. Dry it as it hangs upon them slowly before the fire, and then triturating the hardened lumps gently between the fingers, the feathers will come out almost as clean as ever. To test whether the specimen is too decomposed to skin, try the feathers about the auriculars, and just above the tail, and if they do not move you may safely proceed.

Lay the bird on his back, and parting the feathers from the insertion of the neck to the tail, you will find in most birds a bare space. Cut the skin the whole length of this, and passing the finger under it on either side, by laying hold of one leg and bending it forward, you will be able to bring the bare knee through the opening you have made ; with your scissors cut it through at the joint ; pull the shank still adhering to the leg till the skin is turned back as far as it will go ; denude the bone of flesh and sinew, wrap a piece of hemp round it, steeped in a strong solution of the pounded alum, and then pull the leg by the claw, by which means the skin will be brought again to its place.

After having served both legs alike, skin carefully round the back, cutting off and leaving in the tail with that into which the feathers grow, that is, the "Pope's nose." Serve the wing bones the same as the leg, cutting them off close to the body, and turn the skin inside out down to the head. The back of the skull will then appear, and you will now find it of advantage, as soon as you have got the legs and tail free, to tie a piece of string round the body, and hang it up as a butcher skins a sheep. Make in the back of the skull a cut of the annexed form, with your knife, which you can turn back like a trap-door, and with the marrow spoon entirely clear out the brains ; A representing the neck, and B the skin turned back. Having done this, wash the interior of the skull thoroughly with the alum, and fill it with cotton wadding. The next operation requires care and practice—namely, get out the eyes. This is done by cutting cautiously until the lids appear, being careful not to cut

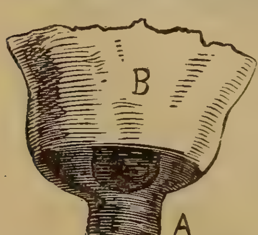


Fig. 23.—Cut in Head.

the eye itself, and you can then with a forceps, which you will likewise find useful, pull each from its socket; wipe the orifice carefully, wash it with the alum solution, and fill it with cotton wadding. Cut off the neck close to the skull, wash the stump, and the whole of the interior of the skin with the alum, and the skinning is done. Now comes the stuffing. The ordinary mode used by bird-preservers is a simple one, and answers very well; there is a French method, however, which has its advantages, and will be adverted to hereafter Take a piece of wire suitable to the size of the bird—that is as large as the legs will carry—and bend it into shape shown in fig. 24, *a* representing the neck, *b*, the body, and *c*, the junction of the tail, allowing sufficient length of neck for the wire to pass through and beyond the head, and being sharpened at each end, which may be done by obliquely cutting it with the plyers. Wind hemp on this wire to the size of the bird's body, which you should have lying by you to judge from, and it will appear somewhat as shown in fig. 25. You can shape it with the hand but be careful not to make it the least too large; and after you have finished it to your satisfaction, you may singe it as a poulterer would singe a fowl, which will make all neat; but be particular to wind the hemp very tight.

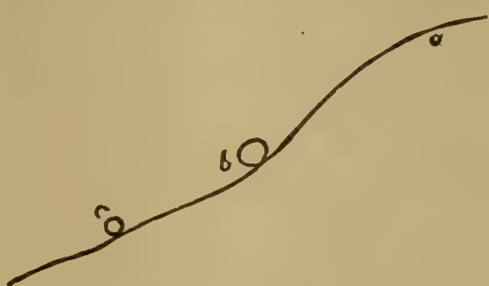


Fig. 24.—*The Wire Bent for Inserting.*

Then take the skin, lay it on the table on its back, and pass the wire at the head into the marrow where the neck

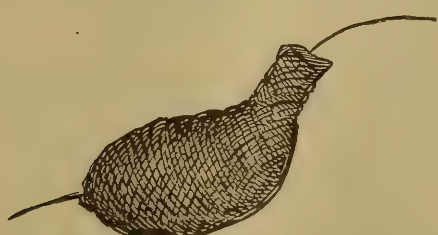


Fig. 25.—*The Hemp wound on the Wire.*

is cut off, through above the roof of the mouth, and out at one nostril, and draw it up close to the skull; turn the skin back, and draw it down over the hemp body, and pass the wire spike protruding through the other end through the flesh upon

which the tail grows, about the center, and rather below than above. The skin may now be adjusted to the hemp body, and sewn up, beginning from the top of the breast, being particularly careful always to take the stitch from inside, otherwise you will draw in the feathers at every pull. At first sew it very loose, and then, with the button-hook, draw it together by degrees.

With the plyers cut two lengths of wire long enough to pass up the legs and into the neck, and leave something over to fasten the bird by to the board or spray upon which it is to be placed. The next operation requires some address and great practice, namely, the passing the wire up the legs. This is done by forcing it into the center of the foot, and up the back of the legs into the hemp body, through it obliquely, and into the neck until it is pretty firm. In doing this, you must remember the ordinary position of a bird when alive, and, therefore, instead of passing the wire the whole way within the skin of the leg, when you get to the part where you have cut off the bone, that is, the knee-joint, pass it through the skin to the outside, and in again through the skin from the outside where the knee would come naturally in the attitude of standing or perching—it makes little difference which. This is essential, because if the wire be passed the whole way inside the skin, it produces a wrong position of the legs. The accompanying cut will illustrate the direction of the line in which the wire should run. The bird is now stuffed, and you may at once place it upon a spray, or board, as the case may be. In placing a bird upon a spray the first joint should be bent almost on a level with the foot; and, in placing a bird on a board, one foot should be placed somewhat behind the other. If the wings are to be closed, as is usual, you may readily bring them into their place by putting the fingers under them, and pressing them together over the back; you may then pass a needle, or large pin, of which you should have a good supply by you, through the thick part of the upper wing into the body, and so by the lower wing, and if you allow these to protrude, you may fasten to one of them a piece of thread, and wind it carefully and lightly round the body, which will keep the feathers in their places, and this thread should be kept on for a fortnight or three weeks, until the bird is dry. The tail should be kept in its place also for the same time, by a piece of thin wire bent over it thus:  The only thing now to do is to put in the eyes. The color of course depends on the bird, and these you may buy at any fishing-tackle shop.

Fig. 26.—Correct Way.

If you do not use eyes too large, you will find little difficulty; the juice of the lids will act as a sufficient cement. As to the mounting, I shall say nothing about that now, but shall only advert shortly to a French method of pre-

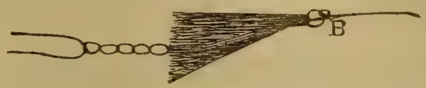


Fig. 27.—Wire used in the French Method.

serving, which is more difficult, but has the advantage of superior firmness. It is this: Measuring from the insertion of the neck to the tail, make a wire frame as in fig. 27, the measure taken being from A to B. Upon this wind taw for the neck only, and place in the skin in the same way as before directed, only that instead of one wire being passed through that in which the tail grows, it is a fork that is passed through it. Having formed this frame, fit on to it two legs as shown in fig. 25; and after the frame itself is in the skin, pass these from the *inside* down each leg, instead of from the outside, and fasten them on to the frame with the plyers by twisting the ends, B B, round the frame, C, shown in fig. 27. This will make all firm, and you can then fill the body with cut hemp and then sew up. One word as to the other preparations used by bird-preservers. These are either corrosive sublimate or regulus of arsenic, which is yellow and of a consistence like butter. As before said, in cold season, when no flies are about, alum will do perfectly; in warm weather either of the two others may be used. I should prefer the former—corrosive sublimate—as the other is "messy," and the chief object is to dry up anything which can be attacked by flesh-seeking insects. When you have finished your bird, you can lay the feathers with a large needle—it is as well to have one fixed in a handle and kept for this purpose—and, tying the two mandibles of the bill together with a piece of thread until the whole specimen has hardened and dried, the work is done.

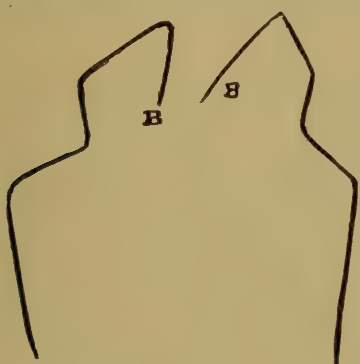


Fig. 28.—The Wire Legs.

PART THIRD.

Instructions for Mounting Birds, Dried Skins, Feathers, &c.

MOUNTING IN GENERAL.

THE stuffing of the bird being completed, the next thing is to place it either on a branch, or if a bird which does not sit on trees, on a piece of plank ; whichever of these it is, two holes are bored for the reception of the wires, which have been allowed to protrude from the soles of the feet, for fixing the bird. (Fig. 11.) These of course are pierced in such situations as are necessary for the attitude or position of the legs. The wires are put through these holes, and twisted so as to secure the bird in its position. The attitude of the bird will of course depend upon the fancy and taste of the operator, and ought to be in conformity with the manners of the bird in a living state.

A general notion will be gathered of the position of birds' legs by studying the skeleton which we have represented in fig. 6. It will be noticed that the three bones which compose the legs are articulated somewhat in the form of the letter Z, varying of course in the inclination of the various bones according to the species of bird. A fault in most stuffed birds is the great and unnatural length of leg seen under the feathers, from the circumstance that the bones are too straight. Even in the division of birds called Waders, such as cranes, storks, herons, &c., where the legs are straighter than in most other orders, the upper joint of the thigh is subject to a considerable inclination. This natural position of the bones of the legs must never be lost sight of in setting up birds after stuffing.

The bird being now placed on its support, and the legs ready to receive their final position, the first thing to be done is to press the two thumbs on the lower limbs or tarsi, (fig 6, *e*,) to give them a backward inclination from twenty to sixty degrees, according to the manner of sitting, natural to the bird. The tibia, or second bone, (fig. 6, *f*,) is next bent forward, by which these bones will now have a position similar to those of fig. 6. The head, neck and wings are then bent, and fixed according to the expression intended to be given to the bird. On the disposition of these, much of the beauty and character depend. The habits of the bird require to be well known, to enable the operator to perform this important part with life and spirit. If the living habits of the bird are

without the reach of his study, he should devote himself to the accounts given of it by naturalists, and also examine the best plates in which the species is represented.

The most common attitude is shown in fig. 31. Where several birds are grouped together the effect is often increased by varying the positions; as, for instance, like those shown in figs. 32 and 33, where one bird is represented looking downward, and another reaching upward as if to capture a tempting tid-bit. In such cases various little accessories, as a bird's nest, an insect on a branch or other appropriate thing, increase the attractiveness.

Having fixed on the attitude, it now only remains to put the feathers into their natural order as smoothly and regularly as possible, and to keep them in this state, they should be bound around with small fillets of muslin fastened with pins, as represented in fig. 28. The bird should then be thoroughly dried, by placing it in an airy situation, if in summer; or if in winter near the fire, but not so close as to affect the natural oil contained in the feathers. The want of proper attention in drying ruins many a fine specimen; if long kept damp putridity ensues despite all preservatives, when the skin will become rotten, and the feathers will soon fall off; besides, the mold and long continued damp change the chemical properties of the preservatives used.

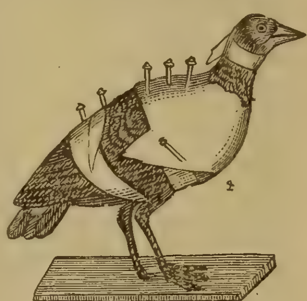


Fig. 28.—Bird Pinned up.

After the bird has been throughly dried, the fillets are removed; the wire which protruded from the head is cut off as close to the skull as possible with the wire-cutting pincers elsewhere shown. It must then be attached to a circular, or other shaped piece of wood, with the generic and specific name and sex, as well as its country and locality attached to it, on a small ticket, when it may be placed in a museum.

Young hands commonly suppose that a bird should stand bolt upright, with the legs almost perpendicular, or at right angles to the perch. This is a great mistake, and never to be found in nature. Do we stand rigid, like a foot-soldier on drill? Does not a bird, as well as ourselves, accommodate itself to the thing upon which it rests? Assuredly it does; for birds do not, as a young bird-stuffer endeavors to do, find always a perch to rest upon in the plane of the

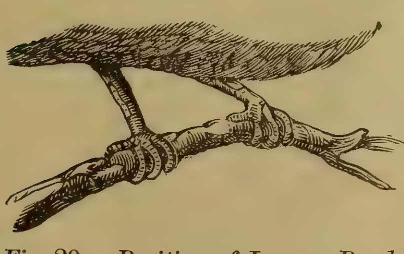


Fig. 29.—Position of Legs on Perch.

horizon. It therefore follows that as he keeps himself upright, his legs must accommodate themselves to his perch. So in the ground-birds there is a gentle slope backward from the hind toe, the balance being preserved in both cases by throwing the body forward in proportion. It is not uncommon to see birds preserved with wings and tail spread. Now ordinarily speaking, this is very objectionable, because very unnatural. A bird preserved is supposed to represent a bird in a state of repose, that is, not in flight; the only modification allowable being with regard to those birds whose manner it may be to have the wings more or less open on occasions; thus the falcon tribe, supposing they are represented as devouring a quarry, or two birds toying with each other. It may be that a bird essentially aereal may be represented as actually on the wing.

With regard to the case there are two methods: one a bell-glass, which glass being now so reasonable, is certainly a very pretty and reasonable way of mounting, but inapplicable to birds which are to be placed on a wall, or to be represented flying; although this may be managed by attaching one wire

Fig. 30 —*The Glass Case for Holding Specimens.*

from the point of the wing to a twig sufficiently firm, which it will scarcely appear to touch, if managed adroitly. It is likewise indespensable that a bird for a shade should be stuffed so well, as to look nicely in all positions. One thing must always be remembered, *do not have your case a shade too large,* just clear the object so as not to stint it for room; and in flat cases this applies chiefly to depth, for it should have sufficient light. or it will not look well. Wooden cases should be made as slight (in thickness) as is consistent with firmness; well-seasoned white pine is best; and the case should be formed of back, top, and bottom, open at the front and sides, and at each corner of the front two slight pine supports, rabbited on their inner edges; the whole appearing as in fig. 30.

Having the case prepared, it should be papered with strong manilla paper on the top and back within, and when the paste is dry, washed over carefully with size and whitening,

tinted with a little stone-blue; some add some touches of white subsequently to represent clouds, the ground representing the air; some also paste a landscape on the back, but this must be good, or you had better have plain color. The bird to be placed in this case is either perching, standing, or flying; for the latter directions have been given. As to the two former, the perch must be firmly fixed in the small piece of flat wood upon which it previously stood, and put in upon it, the wood being fastened to the bottom of the case, either by screwing from below, from above, or gluing with stout glue, or by passing wire through two holes in the bottom of the case and the wood, and clinching above; in this case, or in screwing from below, let the wire or the screw into the wood, and putty over neatly, and so if the bird is represented standing.

The bird being fixed, the next thing is the decorating or "weeding," as it is technically called, and here we enter upon a subject so entirely of taste and fancy, that no fixed rules, as to the disposition, can in all cases be given. One rule applies equally to this as to landscape painting, viz., that there should always be a compensation of objects; that is, if you have a tuft of grass on one side which rises toward the top of the case, there should be something in the lower opposite corner to strike the eye, but not to rise above the midway up at furthest, and the ground, or floor, should not be over-furnished with moss, &c. After the bird is fixed, the whole bottom should be carefuly glued over with thin glue, taking care, where the bird's feet are on the bottom, not to touch the toes with the glue. Some fine-sifted sand or gravel should then be sifted over it, and it will adhere wherever the glue has touched; for this purpose a small tin shovel is best, of the usual shape, and about two inches wide by four long, with a handle in proportion, which can be made to order at any tinman's for a trifle.

Everything used in "weeding" should be baked in a slow oven, otherwise spider's eggs and minute creatures, which are pretty sure to be contained in it, will make their appearance after the case is closed, in the disagreeable formof destroying your specimen. Moss, &c., by being slowly dried, will also keep its color better. Yellow moss, found on the roofs of old barns, and dark gray of the same species, are very generally useful; and where yellow moss cannot be had, the white or gray may be colored with chrome, and looks as well. Water plants fade, being more or less succulent, and hence a little common water-color with gum will be used with advantage and look less artificial than oil paint, which is often used. Fern looks very pretty as an adjunct for heath-birds, but it should be dried gradually and carefully, when *quite* full grown, and a small touch of light green, permanent white forming

a portion of it, will give it a freshness and more natural appearance.

Grass in seed (not in flower) of various kinds is also a very pretty addition ; but bird-preservers have a habit of using dyed grass, and yellow and red *xeranthymum* or everlasting, which is certainly to be avoided, and indeed anything which is unnatural. If it is wished to introduce a lump of earth, or an apparent bank, a piece of thick brown paper, bent to the requisite shape, and glued over and covered with sifted sand or gravel, has a very good effect ; but insects and butterflies, or artificial flowers, unless they are extremely natural, would better be avoided. Regard should also be had to the season at which the bird is usually seen. For instance, summer birds are, of course surrounded by green and living objects, but autumn or winter visitants by decaying or dead herbage.

It has often been made an experiment to represent snow, but it is difficult to obtain anything white enough, and at the same time of a crystalline character, which, of course, it should be. Potato farina nicely dried, mixed with Epsom salts pounded very fine, does not make a bad substitute ; but the real difficulty lies behind, namely, the fixing it, and, more than all, the least damp takes very much from its appearance, if it does not destroy the effect, and hence we must have recourse to mineral aid, and any very white mineral powder mingled with pounded glass is perhaps best. It is unnecessary to say that the herbage upon which it is meant to rest should be touched all over with paste, not glue, and the white mixture shaken over it and left to dry. What will highten the effect very much, if prettily executed, is a back landscape with a dark leaden sky and nearly black earth mingled with moss.

To represent water, a small piece of looking-glass, surrounded with moss, &c., answers very well. The bills and legs of birds should be always varnished, and where the natural color fades after death it should be restored by a thin coat of oil color of the required shade. The bird being fixed and the case garnished, nothing remains but to put in the glass ; this is in three pieces, one for the front and a piece at each end. This can be pasted in with very strong paper round the edge, advancing sufficiently over the glass to hold it. In doing this it is not necessary to be very particular to avoid pasting the glass, as after it is dried it can be wiped clean with a damp cloth. The last operation is a very simple one, and is done in a few minutes. You must procure some black spirit-varnish, which you can make yourself by dissolving the best black-sealing-wax in spirits of wine, and should be kept corked ; when this is good it acts as paint and varnish at the same time, and dries as fast as it is put on. One or two brass rings screwed on at the top of the back of the case will finish the bird, and if the case be nicely and closely made, there is

no limit of time to which the preservation of the specimen may not extend.

We must now describe the mode of setting up a bird with extended wings. After having proceeded with the stuffing as formerly directed, and the central supporting wires have been put in their places, pointed wires are to be thrust from the inside through the wings, reaching as far as the metacarpus and the carpus, that is to the arms and fore arms; the ends which remain in the body are formed into ovals, of the same size as those of the central wires, and firmly attached to them either with threads or small wires. The wings may now be raised to any hight wished, and disposed agreeably to the

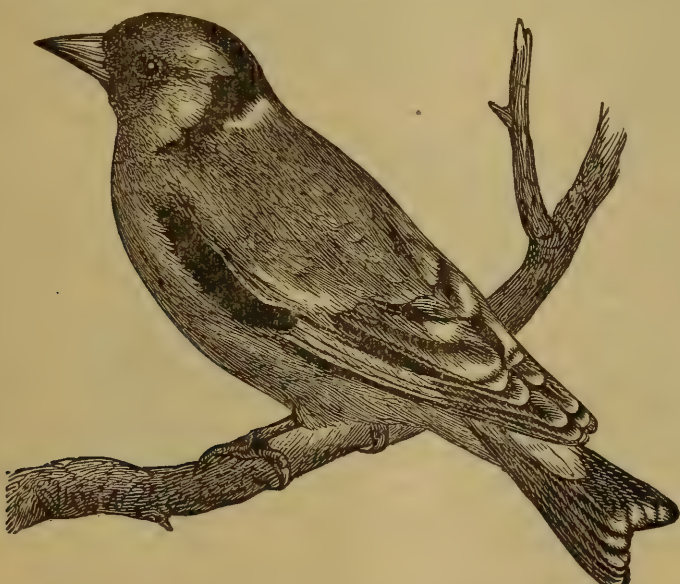


Fig. 31.—*The Goldfinch.—Common Position in Mounting.*

taste of the operator; and should he feel a difficulty in pleasing himself, a good engraving may be copied.

If it is intended to represent the bird flying, its wings are extended to their utmost stretch, the tail placed horizontally, and expanded, the neck forced forward, the legs and feet drawn close up to the breast, with the toes closed. It may then be suspended from the ceiling, by a piece of very fine *brass* wire, such as is used for piano-forte strings. This may either be attached to a hook in the back, placed betwixt the wings or drawn through the body with a very long slender needle. The best plan, if you have determined on the flying position, previous to stuffing, is to fix this small wire to a transverse piece of strong wire, attached to the oval inside,

which should be placed pretty far forward, so as to balance the bird.

A very spirited and striking position is, when the bird is about to take flight. In this attitude, it is placed with the body inclining forward, and the wings slightly raised, which can be managed without the assistance of the external wires by merely placing a little cotton or tow under the wings, while the skin is yet wet.

The moment of alarm is also an interesting attitude. To express this, the one foot should be placed stretched forward, and the other drawn near the body, and considerably bent. The body must be thrown to one side, with the wing on that side much elevated and spread out, while the other is placed lower and less diffuse; the tail must be expanded, thrown down at the point, and arched; the neck should be elevated, and inclined to the side next the foot which is drawn up; the head turned to one side, and the eye riveted on the object of its terror; the bill must also be open.

In eagles, vultures, and other birds of prey, a favorite attitude is the position of seizing their prey. This varies according to the species. The golden eagle, when he has seized his victim, expands his wings and tail, like a curtain around the bird, gazes upward, and throws his head backward in an attitude of triumph and defense; the feathers of his crest and neck stand nearly erect, and he gazes around in every direction, to observe if he is safe from the intrusion of an enemy before he devours his victim. Suitable birds or small animals may be stuffed and placed in the bird's talons.

Descriptions of this kind are endless; let those who intend stuffing birds study nature in its various details, and where this cannot be come at, good books and prints will be found an excellent substitute.

METHOD OF MOUNTING DRIED SKINS.

Having treated of all the different modes which we know can be successfully practiced, in stuffing recent specimens, we must now say something respecting the setting up of skins which have been preserved by travelers, and sent home from distant parts.

The general method is exactly the same as in stuffing recent specimens. There are, however, some preliminary steps, which it is necessary to know.

If the specimen sent home has been partially stuffed, our first business is to undo the stitches, if it has been sewed—which was an unnecessary process. We then remove the whole cotton or tow from the inside, by the assistance of forceps, and from the neck with a small piece of wire, twisted or hooked at the end. Having finished this, small balls of wet cotton are placed in the orbits of the eyes, and the legs and

feet are wrapped round with wet cotton or linen rags. A damp cloth is then thrown over the bird, and it is allowed to remain in this state till next day. The neck and body are then filled with wet linen or cotton, and it will be ready for commencing setting up in four or five hours.

The eyes are now put in, as directed in the recent subjects, and then stuffed in exactly the same manner. Some difficulty will, however, be experienced with respect to the leg-wires, and it will require more time and care from the dryness of the legs, to get the wire to penetrate. Having proceeded so far as to get the bird generally formed, the wings are next adjusted : this also is frequently difficult, owing to the stiffness, of the tendons, and want of proper attention in skinning and drying them at first. Indeed with some of the South American

Fig. 32.—The Oriole.—Looking Downward.

birds, a proper adjustment of the wings is found impracticable, owing to the attempts of the native Indians of Guyana, who seldom dispose them properly. There is something extremely curious in the efforts of a man in a savage state. Whether this arises from want of observation, or a vitiated taste, it is difficult to say ; but it is a notorious fact, that any attempt at art, by an uncivilized people, is generally widely different from what the object is in nature : and yet the opportunities of these people are much greater, in studying or even observing natural objects than that which is enjoyed by a man in a civilized state.

We have seen a bird entirely mounted by the Indians of Guyana, which was placed in an attitude so fantastic, and so out of all possibility of the bird's assuming in a natural condition, that we could only suppose it to be the harlequin of birds.

When these skins—frequently exceedingly valuable from their rarity—are undone, to be remounted, it is oftentimes found utterly impossible to get the wings to take a natural set; in which case, there is no other remedy but cutting them off close to the body, and fixing them anew. The scapulars are separated, they are softened with damp cloths, and then wrapped up with bands of sheet lead, to give them a proper set. When we have got them in their natural shape, they must be fixed to the sides by cement and cotton, and a long pin through each, with the head concealed among the feathers. The scapulars, which we have cut off, must then be cemented on, and they will effectually cover the joining of the wings. The bird being now arranged, and all the feathers adjusted, it is wrapped round with small bands of fine linen or muslin, and set aside till thoroughly dry.

Should any feathers be disengaged, during the mounting, they must be kept, and when the bird is dry, we can replace them in their proper situations with a pair of forceps, after they have been touched on their shafts with the cement; the feathers around the place in which we intend to insert them, must be held up with the probing-needle, fig. 20, page 33.

If any of the feathers are disarranged in mounting, and have got a wrong set, the only way to remedy the defect is to pull them out with forceps, and re-insert them with cement.

OF MOUNTING BIRDS, FEATHER BY FEATHER.

Rare birds are frequently received from foreign countries, the skins of which are in such a state of decay, that it is impossible to mount them by the ordinary processes above described. The only way in which they can be preserved, is to mount them feather by feather, which, however, is a very tedious method. It is as follows:

Procure a piece of soft pliable wire, such as is used by bell-hangers; or take some of the ordinary wire used, and make it red-hot in the fire, and allow it to cool gradually, when it will become quite pliable. Take five pieces of this, of different lengths, and form them into the skeleton of a body; namely, two for the back, one on each side, and one to represent the breast-bone. Imitate the shape of the bird's body as nearly as possible. The wires must be roughened with a file, at the place where all the wires meet, at the neck and rump; and first wrap the place next the neck round with strong thread or fine brass wire. The two pieces intended for the back must bend gently downward, and be gradually separated from each other toward the center, and brought together again at the place intended for the rump, whither they must intersect each other, and be twisted two or three times, to keep them in their places; they are then spread out as supports for the tail; the side pieces are next formed, so as

to represent the natural bulge of a bird's body, and attached to the rump; the piece representing the breast is then formed, joined at the rump, and afterward continued as long as the other tail-pieces, to support the center of the tail; while at the front extremity a piece is left, for the purpose of forming a neck to which to attach the head. Two leg-wires are attached to the side-wires, by being rolled round them for several turns. Thus we have in our framework an outline of the bird's shape, any slight defects in its form being corrected as the work progresses.

After this body has been properly formed, it must be

Fig. 33.—*The Wren.—Position Reaching Upward.*

wrapped round with tow-sliver, (see department of Recipes,) and the neck thickened to its required dimensions. When this is accomplished, the head, legs, wings, and tail are softened in the usual manner; the eyes are then fixed in with some cotton introduced into the orbits, with a little of the cement. The wings and tail are now placed on a table, with a flat leaden weight above each, to restore them to their natural shape. The leg-wires are then passed through the legs, commencing at the top, and bringing them out at the soles of the feet, and left with a piece extending beyond the claws.

The tail is now fixed on, by first attaching to it a quantity of cotton with the cement, and when dry, it is fixed to the part intended as the rump.

The feet of the bird must be fixed into a piece of wood, as a perch, the ends of which must be left some inches beyond the body. The end next the tail is fixed into a table-vice, with the belly upward, and the head pointing toward the operator. The feathers are now put on, commencing under the tail, or crissum, with what are termed the under-tail coverts ; a coating of cement must be previously laid on, to attach the feathers with. It is proceeded with upward to the breast, and finally the length of the neck, taking care to put the proper feathers on their respective sides, as the side-feathers have all an inclination to one side. The bird is now turned with the back up, still keeping the head toward the stuffer ; and the wings are fixed on with cement, and pins forced through the beards of the feathers to conceal the heads. When this is done, put on the feathers of the rump, and proceed upward, as has been done with the belly. After reaching the top of the neck, the head is then fixed on with some cotton immersed in the cement, and allowed to dry before attempting to put on the feathers.

In this mode of mounting a bird, there are several things which must be attentively adhered to ; these are—first, not to put the feathers too thick, for there is a danger of running short ; secondly, all the shafts of the feathers must have a small bit cut off the tip, so as to admit the cement and to give them a firmer hold ; and thirdly, that the feathers should all occupy their respective parts ; and fourthly, that they should be arranged as they are in nature on these parts, as the disposition of every part of the body is peculiar to itself.

At first, this mode of setting up birds will be found a difficult task, but a little practice and experience, will make it familiar and comparatively easy, although it will always be found a tedious process. We have seen some specimens set up in this way, which we could hardly detect from those mounted in the ordinary manner.

Besides what we have already said concerning the stuffing and preparing of birds, there are many details connected with particular species which demand our attention, and which can only be described as regarding that species. It will, however, be impossible for us to enter into all these minutely, but only give a few examples as general guides. We shall take these in systematic succession.

PRESERVATION OF COLOR.

In the preservation of the feathers of birds, little else is required to prevent the dissipation of their colors than to keep them as much as possible from air and light. These two

agents, which were indispensable to their beauty and protection in a living state, now exercise their influence as destroyers, and that influence will sooner or later work its ends according to the quality, texture, or color of the object with which it is contending. The feathers are now deprived of two agents, which in a living state contributed to their vigor and their beauty, namely, the internal circulating juices which they received from the body of the animal, and the external application of oil by the bill of the bird, supplied from a gland which is placed over the rump of all birds.

The colors of the rapacious tribes are not so evanescent as those of many others, as they, for the most part, are composed of intense browns and blacks, which are not so easily absorbed by light or air, so that they continue for a very long period without any sensible difference. There are, however, certain other parts which are liable to almost immediate change of color after the death of the animals, and these are the cere and skin of the legs and feet, and the naked skin on the heads and necks of vultures and their congeners. We shall treat of these individually.

OF VULTURES.

The birds of the genera *Vultur* and *Cathartes* of Temminck's arrangement, are distinguished from their heads and generally the upper parts of their necks and a spot on their breast being naked. Now, this naked skin usually loses color and becomes of a dirty brown or yellow. It is evident, therefore, that if we wish to give these parts in our stuffed specimen the appearance they exhibited while alive, artificial means must be employed ; and this can only be done by the application of paints or colored varnishes. It is well known, that during life these naked skins on the head and neck, were liable to change of color from the influence of the passions of the bird, as either excited by love, fear, or rage ; all of which must be considered in preserving. For example, the skin of the ash-colored vulture is of a livid blue color when the bird is in a quiescent state, but under the influence of love or rage, becomes of a bright reddish hue ; so that either of these must be adopted in our preserving, according to the character we intend giving.

The king of the vultures has a fleshy cere of a bright orange color, or rather inclining to vermilion, which is prolonged above and between the nostrils to an elevated comb ; a scarlet circle surrounds the eye ; the remainder of the head is purplish black. The back of the head is covered by a patch of short blackish down, and behind the eye on either side are several broad and deep wrinkles of skin, giving origin to a thick and prominent fold, which extends obliquely downward along the whole of the neck. This fold, when the bird is in an unexcited

state, is of a reddish-brown, mingled with blue, and is traversed by numerous lines of minute black hairs. From the upper part of the neck, which is of a bright red, the color gradually becomes less intense, and fades into orange and yellow as it descends toward the lower part. The legs and claws are of a dusky black, but sometimes the former are reddish, and at other times of a dirty white. This depends on the age of the bird.

Now, as all these colors which we have described are liable to change, immediately after death, it is evident that considerable nicety will be required to give the preserved specimen the appearance of nature. These must, therefore, be supplied artificially with the varnish colors, which we have particularly described in their proper place; as also the combinations for the formation of compound colors. The reddish brown color mentioned, of which the fold is composed, must be touched by a mixture of the scarlet varnish, with a little powdered burnt-umber and the blue streaks with it is traversed, colored above with cobalt blue. All the varnish colors have a tendency to shine, which, it will be evident, is not the character of any part of the skin, or caruncle of the bird described. As soon, therefore, as it is thoroughly dry, which will be in about an hour, the whole surface must be gently rubbed with very fine sand-paper, which will completely remove the gloss, and give the appearance of nature.

Some nicety will be required in painting between the hairs, but it can be easily managed with a little caution. Sometimes these hairs are liable to become brown, in which case they can be touched with the black varnish.

As these birds are inhabitants of warm climates, some care is requisite; and after killing them, to prevent decay, the tendons of the legs should be extracted to prevent their being attacked by moths, and their place supplied by some cotton and preservatives. The tendons are extracted by means of a longitudinal incision made behind the tarsus. The edges of this incision can easily be brought together when the bird is under the process of preparation.

PARROTS, &c.

Great latitude may be used with the setting up of this tribe —their colors are for the most part very brilliant, but they should not be too much exposed to the light. Those having purple, orange, or lilac tints, are particularly liable to change.

The legs, cere, and naked parts of the face of parrots, and their congeners, will require, for the most part, to be refreshed with the colored varnishes. Their limbs and bills have frequently the appearance of being powdered. In these species, this appearance is to be given by washing the bill, &c., with mastic varnish and dusting the pollen powder through a

pepper-box over them. This powder is described in the Chapter of Recipes.

In this order are also the woodpeckers, which are true climbing birds, and should be attached to the trunk or branches of trees—they seldom expand their wings—they are assisted in climbing by their tail, consequently, it almost always forms an inclined plane to the back of the bird.

The comb of the common cock and its wattles will require to be colored with the red varnish, to which must be added a little lake; as also the comb of the Guinea-fowl. The particular passion of the animal at the time will also have to be studied, and the color of his head and throat, which is liable to great change under different impulses. The male pinnated grouse has a large, skinny membrane on each side of its neck, which it inflates during the season of love, and which is in size and color similar to a ripe orange. This must be colored with the red varnish, mixed with either gamboge, or chrome-yellow. The general habits of these birds are familiar to most people.

OSTRICH, &c.

It falls to the lot of few to preserve this bird; but as the frame-work for it must necessarily be commensurate with its size, the manner of constructing it we shall describe:

A piece of wood eighteen inches long, and four inches in circumference, is first taken, and a hole bored eight inches from one of its ends, from which form a groove, to the shortest end, both above and below; four inches from the other extremity two holes are pierced, at four and six inches from the end. The wire which is to support the head of the ostrich is passed through the perforation, which is eight inches from the end; it must extend eight inches out of the hole; the two ends of the wire are now pressed flat down into the furrows, which have been formed for their reception. Strong wire nails are put in obliquely to keep the wires in their places; the heads of the nails crossing above the wires; and by the addition of strong iron wire they can be still more firmly bound down. The long end of the wire, which has been left uncut, must now be cut off, corresponding to the lengthof the neck, head, and bill, of the ostrich, which must be accurately measured. The wire must be at least a quarter of an inch in diameter. It must be inserted into the neck previous to putting in the stuffing. The head and neck are now filled with chopped tow, and when properly stuffed, as well as part of the back, the wood must be placed in the middle of the body to supply the place of the oval in smaller birds. The leg-wires must be at least three-eighths of an inch in diameter. When the first one has been forced up, it must now be extended to the hole, which was six inches from the end, passed through

it for the length of six or eight inches; curve it back to the end, and fix it down with two nails. The same is done with the wire of the other leg, which must be passed through the other hole. The whole are now firmly wrapped round with cord. The other parts of the stuffing are done as directed for smaller birds.

Besides a strong application of arsenical soap, we would

Fig. 34.—*Virginian Eared Owl.*

recommend Mr. Waterton's plan of touching all the feathers with the solution of corrosive sublimate, and the roots of the feathers should be well soaked with turpentine, which ought to be repeated at intervals of some months.

The same method of stuffing is adopted with the emu, the galeated cassowary, and other large birds. The head of the latter bird is of a fine vermilion behind, and also the wattle

on the throat, with its appendages ; these must be colored with the red varnish ; the sides of the face and throat are of a beautiful violet tinge, which is composed of lake and Antwerp blue, in combination with the white varnish. When dry, these must be dimmed with sand-paper, as formerly directed ; the legs must get a coating of the same color, with the addition of some white lead to render it paler.

OWLS.

In skinning the different species of the owl genus, much care is to be exercised in drawing the skin of the neck over the head, as it is generally so very large in proportion to the thickness of the neck that it is no easy task to get it to pass over without either stretching or tearing the skin ; this must be assisted by the use of the nails of the thumbs, and easing it all round with the end of the scalpel-handle.

The attitudes of these birds are always very simple. They are generally sitting in an upright posture, or devouring their prey, in which little energy is expressed.

WADERS.

This order consists of birds which frequent the sea-shore, margins of lakes and rivers, feeding on fish, worms, &c. In stuffing, they must necessarily always be placed in standing or walking postures. They walk with a slow and measured step. Many of them enter the water without swimming, and hence their designation, Waders. As we recommended in the vulture tribe, the tarsi must be opened, and the tendons taken away to prevent putridity, to which they are very liable.

Birds of this order must be placed on flat boards, or circles of wood turned for the purpose. Their skins are of a very greasy nature, and require to be particularly well primed with the arsenical soap, and after they have absorbed this, with the solution of corrosive sublimate.

THE FLAMINGO.

This bird is one of those, whose head cannot be passed within the skin of the neck during the operation of skinning, so that a different mode of treatment becomes necessary. When obstacles of this nature come in our way, we must, in the first place, bare the neck as high as possible, by introducing the scalpel-handle between the skull and the skin. The neck is then cut off as high as we can reach, and the skin pulled straight while it is yet soft. It now becomes necessary to make an incision behind the head, by which to remove the remaining vertebræ and the brain of the bird ; the skin must be laid back to the right and left, and cut as low as the first vertebra. The occipital hole is then enlarged, that we may more easily extract the brain ; and the eyes are taken out by

the same opening. The orifice is then sewed up with very fine stitches, taking care to separate the feathers at every stitch.

The wire of the neck must be placed before the stuffing is commenced. The other parts are stuffed in the ordinary way. The leg-wires are next put in. The bone of the tarsus is pierced near the heels with a triangular bodkin (see page 33, fig. 18). The point of the leg-wire is now introduced into the perforation. When the point has reached the knee-joint, we must press pretty hard while we turn it round and round, till it penetrates the apophysis of the tarsus, after which, it will easily be forced to the top of the thigh. The feet being palmated, must be spread, so that the membrane which connects the toes may be distinctly seen, and the webs put down with small pins.

The same mode of treatment is pursued with the *Jabirus* (*Mycteria Australasia*, and *Americana*).

GREBES, &c.

These are all covered with a very thick, glossy, and close plumage; their legs are placed far behind. They are but ill adaptad for any variety of form in stuffing. When out of the water they can hardly walk, and sit quite erect with the point of their toes merely seen beyond their feathers. An error very common in stuffing this bird, is exposing the tarsus too much, which in a living state, is hardly ever visible while sitting. They are very easily prepared, as the thickness of the feathering conceals most defects.

GEESE, DUCKS, &c.

The chief thing to be attended to is the placing of the legs. They are, for the most part, set far back. Some of the bodies are erect when sitting, with the legs almost entirely concealed, and others, such as the swan, goose, &c., have their bodies placed horizontally. The thigh-bone (fig. 2 *f*, page 25,) should be forced close to the breast in front, with an angle of forty-five degrees below. The body should be nearly horizonal, and the neck in the form of an S.

The duck tribe have, in general, large heads, and like the flamingo, cannot be passed through the neck, so that it frequently becomes necessary to make an incision at the nape for extracting the brain and eyes.

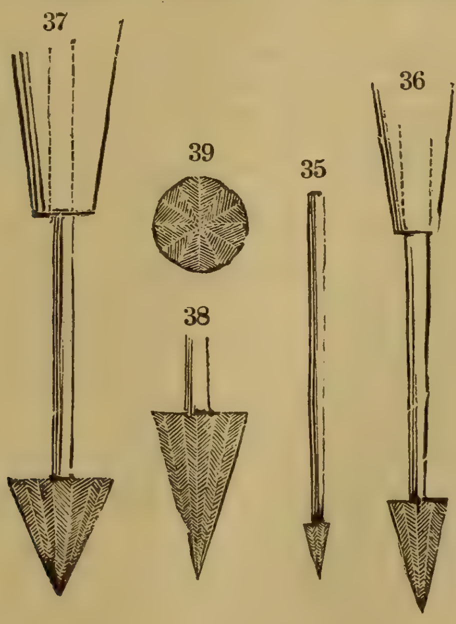
Others of this order have very fat skins inside, so that great caution is necesssary to prevent it from soiling the plumage while taking off the skin. A very large proportion of cotton and tow, therefore, becomes necessary.

PART FOURTH.

The Smithsonian Institute Method of Cleansing, Preparing and Preserving Bird's Eggs.

GENERAL DIRECTIONS FOR EGG-BLOWING.

EGGS are emptied with the least amount of trouble, at one hole, which should be drilled in the side with such an instrument as shown in the sketch, figs. 35, 36 and 37. The great object to be attained is the formation of a circular hole with smooth edges. Collectors not having such a drill as is here recommended, will find a common nail or three-cornered needle a useful substitute, but great care must be used. The hole should, of course, be proportioned to the size of the egg, and the amount of incubation it has undergone. Eggs that are hard sat upon are more easily blown by being kept a few days, but the operation must not be deferred too long, or they are apt to burst violently immediately on being punctured, though this may be avoided by holding them under water while the first incision is made. The hole being drilled,



Figs. 35 *to* 39.—*Egg Shell Drills.*

[Figs, 35, 36 and 38, natural size. Figs. 38 and 39, enlarged]

the lining membrane should be cleared away from the orifice with a pen-knife, fig. 40, by which means not only is the removal of the contents, but also the subsequent cleansing of the specimen facilitated. The small end of a blowpipe, fig. 41, should then be introduced, while the other extremity is applied to the mouth, and blown through, at first very gently.

If the embryo is found to be moderately developed, a stream of water should be introduced by means of a syringe, fig 44, and the egg then gently shaken, after which the blowpipe may be again resorted to, until by the ultimate use of both instruments, aided by scissors, figs. 46 and 47, hooks, fig. 45, 49 and 50, knives, figs. 51, 52 and 53, and forceps, fig. 16, the contents are completely emptied. After this the egg should be filled with water from the syringe, gently shaken, and blown out, which process is to be repeated until its interior is completely cleansed, when it should be laid upon a pad of blotting paper or fine cloth, with the hole downward, its position on the pad or cloth being occasionally changed until it is perfectly dry. During this time it should be kept as much as possible from the light, especially from the sunshine, as the colors are then more liable to fade than at any subsequent time. In the case of very small eggs, when fresh, the contents may be sucked out by means of a bulbed tube, fig. 45, and the interior afterward rinsed out as before.

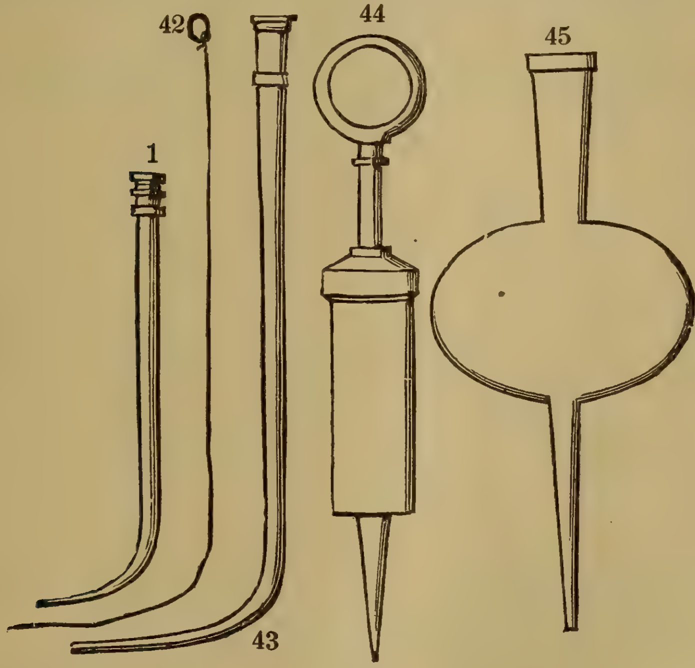
It is always advisable, as far as possible, to avoid wetting the outside of the shell, as the action of water is apt to remove the bloom, affect the color, and in some cases alter the crys-

Fig. 40.—Penknife, half natural size.

tallization of the shell; consequently dirt stains or dung spots should never be removed. While emptying the contents, it is as well to hold the egg over a basin of water, to avoid breakage in case of its slipping from the fingers. Eggs that are very hard sat upon, of whatever size they be, should be treated in the manner which we shall give a little further on, in describing fig. 55, which is a method superior to any other known at present to the writer for preventing injury arising to them. Should the yelk of the egg be dried up, a small portion of carbonate soda may be introduced, with great care that it does not touch the outer surface of the shell, in which case the color is likely to be affected, and then the egg filled with water from the syringe, and left to stand a few hours with the hole uppermost, after which the contents are found to be soluble and are easily removed b the blowpipe, assisted by one of the hooks. It is almost unnecessary to add, except for the benefit of beginners, that the manipulation of the different instru-

ments requires extreme caution, but a few trials will give the collector the practice necessary for success. Those who may still prefer to blow eggs by means of two holes, should not make them at the ends of the eggs, nor at opposite sides, but on the same side, fig. 54. In this case the hole nearest the smaller end of the egg should be the smallest, and the contents blown out at the other. If the holes are made at the ends of the eggs, it not only very much injures their appearance as cabinet specimens, but also prevents their exact dimensions from being ascertained accurately; and if they are made at opposite sides, the extent of the show surface is thereby lessened.

Eggs should never be written on until the shells are perfectly dry, or the ink will be found to run, and the inscription



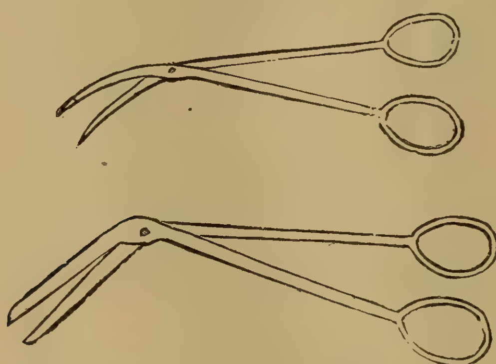
Figs. 41 *to* 45.—*Implements used in Egg-Blowing.*

[Figs. 41 to 44, natural size. Fig. 45, half natural size.]

will be found illegible. Eggs with chalky shells, such as those of gannets and cormorants and others may be conveniently marked by incising with a pin or the point of an egg-drill. The inscriptions should always be placed on the same side as the hole or holes, and confined within the smallest limits possible. For drilling the hole or holes the side presenting the least characteristic markings should be selected.

DESCRIPTION OF EGG BLOWING IMPLEMENTS.

Figs. 35, 36, and 37, represent drills for making neat and circular holes in the shell. These drills should be made of the best steel that can be procured, and of different sizes. Fig. 35 is meant for the smallest eggs, even humming bird's, up to those say of a robin. The grooves forming the drilled surface should be cut with a chisel. Fig. 36 will suit the generality of eggs, excepting those of very large birds and of sea fowl, which usually lay eggs with a strong but soft shell. The grooves may be cut either with a chisel or a file, but if with the latter, greater care will be requisite in its use. Fig. 37 is intended for the largest eggs, and even some of the smaller ones which have a chalky shell, such as the crotophaga. The grooves are cut with a file. In the manufacture of these drills the greatest care is necessary that the grooves should lie parallel to one another, and that their edges should be smooth. The smaller the drill the more acute should be the angle it forms at the point. The drills may be fitted with handles or



Figs. 46 *and* 47.—*Scissors.*

not, according to fancy. Those with handles are less likely than the others to cramp the fingers of the performer, an inconvenience which often causes breakages.

A separate sketch is given with the enlarged views of the end of a drill, in order to show more plainly the manner in which the grooves should be cut.

Figs. 41 and 43 represent blowpipes for emptying eggs. They are best made of metal, and for this purpose nickel or German silver is preferable, as being less liable to rust. A collector should have two sizes, as a large size is not convenient for small eggs, and a small one causes loss of time in blowing large eggs. The chief point to be attended to in their construction is that the lower orifice should be as large as the size of the pipe permits. It is of course necessary that they should be perfectly smooth outside toward the lower end.

They may be straight, although the curve will be preferable.

Fig. 45 represents a tube for emptying small eggs by suction. The bulb is to receive the contents of the egg and prevent them from reaching the mouth of the operator and thus causing nausea. This instrument is best made of thin glass, as thereby it can be easily kept clean. The same remark applies to this as to the last, with respect to the size of the lower orifice.

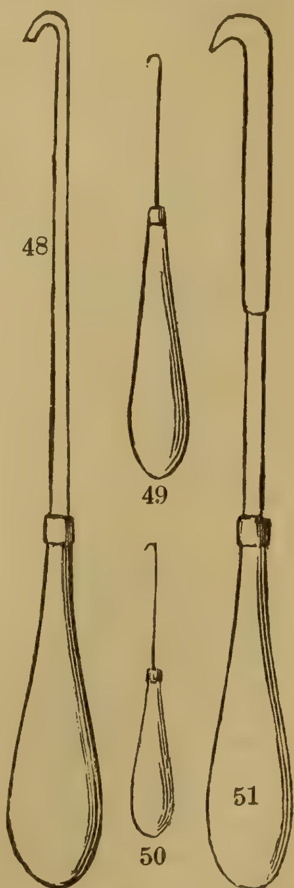
A piece of thin wire, fig. 42, long enough to pass entirely through the tubes, should be always kept at hand by the operator, to remove obstructions which are likely to occur from small pieces of the embryo or half dried yelk being accidentally drawn into the tubes or blowpipes.

Fig. 44 represents a syringe, which will be found useful in rinsing out the inside of an egg. It may be made of any metal, though the pewter ones are apt, from their weight to be clumsy. Nickel is recommended as for the common blowpipes. The lower orifice should be as large as possible. The ring at the top should be large enough for the insertion of the operator's right thumb, as it must be remembered that he has to work it with one hand. The nozzle as shown in the figure, is rather too tapering. It should be smaller in proportion at the upper end.

Figs. 46 and 47 represent scissors of shapes likely to be found very useful. Fig. 47 for cutting through the bones of the embryo before it is extracted, and fig. 46 for cutting off portions of it while it is being extracted by one of the hooks represented in figs. 48, 49 and 50 ; which should vary in size from that of an ordinary pin to that of stout wire. The length of their straight portions should be rather more than the diameter of the egg they are used on.

Fig. 51 represents a knife with a crooked blade, somewhat like a bill hook, and may be useful in cutting up the embryo prior to extraction.

Figs. 40 and 52 represent a penknife and scalpel with elongated blades or shafts, to admit of their being introduced into the egg to cut up



Figs. 48 *to* 51 —*Various Implements.*

[See description.]

the embryo. Fig. 40 is also, perhaps, the best instrument with which to remove the lining membrane from the hole. This is done by inserting the blade perpendicularly and slightly scraping the edge of the hole, as soon as it drilled.

Fig. 53 represents a forceps for extracting the pieces of the embryo when cut up. The spring should not be too lively,

Fig. 52.—Scalpel, half natural size.

as its resiliency may occasion breakage. The grasping surfaces should be roughened to prevent the pieces slipping.

Fig. 55 shows a piece of paper, a number of which when gummed on to an egg, one over the other, and left to dry, strengthen the shell in such a manner that the instruments

Fig. 53.—Forceps, half natural size.

above described can be introduced through the aperture in the middle and worked to the best advantage, and thus a fully formed embryo may be cut up, and the pieces extracted through a very moderately sized hole; the number of thicknesses required depends greatly upon the size of the egg, the length of time it has been incubated, and the stoutness of the shell

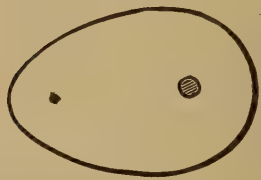


Fig. 54.—Holes Drilled in Egg.

Fig. 55.—Cut Paper.

and the paper. Five or six is the least number that it is safe to use. Each piece should be left to dry before the next is gummed on. The slits in the margin cause them to set pretty smoothly, which will be found very desirable; the aperture in the middle of each may be cut out first, or the whole series of layers may be drilled through when the hole is made in the egg. For convenience sake the papers may be prepared already gummed, and moistened when put on in the same way that adhesive postage-stamps are used. Doubtless patches of linen or cotton cloth would answer equally well. When the operation is over, a slight application of water, especially if warm, through the syringe, will loosen them so that they can

be easily removed, and they can be separated from one another and dried to serve another time. The size represented in the sketch is that suitable for an egg of moderate dimensions, such as that of a common fowl.

Observations.—The most effectual way of adopting this plan of emptying eggs is by using very many layers of thin paper and plenty of thick gum, but this is of course the most tedious. Nevertheless, it is quite worth the trouble in the case of really rare specimens, and they will be none the worse for operating upon from the delay of a few days, caused by waiting for the gum to dry and harden.

PART FIFTH.

Skinning, Preserving and Setting up Fishes, Reptiles and Molluscous Animals, &c.

OF FISHES IN GENERAL.

THE best method of securing the scales and colors of fish, is, as soon as they are caught, to apply cambric or tissue paper to them, which will soon dry and adhere firmly ; the body may be then taken out and the skin dried. When the skin is to be stuffed, roll it in a moist cloth, which will not only render it pliable, but also soften the tissue paper, so as it can be removed, when the colors will be found to be much brighter than by any other method with which we are yet acquainted.

OF SKINNING FISH IN GENERAL.

The fish should be procured as fresh as possible, more particularly if it is one of those on which the scales are loosely attached. Lay it on one side and cut out the gills with a pair of scissors, then introduce a little tow or a piece of sponge into the place to prevent the blood from flowing during the process of skinning ; carefully wipe the sides of the fish with a damp sponge ; let the fins be raised and gently extended, and two pieces of paper, something the shape of each, be placed under them, only extending a little beyond them. Coat the paper with a weak solution of gum-arabic, and put a piece of similar size on the top of the fin, by pressing these gently they will adhere and dry in a few minutes ; these will keep the fins extended, and preserve them during the operation of stuffing. When these are dry, take a piece of tissue paper or thin silk, and press it gently on one side of the fish.

The natural glutinous matter which covers the scales will be sufficient to make it adhere firmly, it will soon dry and form a strong protection to the scales during the skinning; without this precaution the skin could not be removed from mullet, sea-beaver, &c., without the scales being much disfigured, and losing many of them. Indeed, in such fishes, it is not amiss to put on an additional coating of paper with gum-water. This will not only secure the scales, but will also assist in keeping the proper form of the fish, by preventing distention.

When these papers are thoroughly dry, turn the fish on a soft cloth, with the uncovered side upward, and open it with sharp scissors from the bottom of the tail-fin to nearly the point of the snout, keeping as correctly on the lateral line as possible, which can be seen in most fishes. The cheek should be afterward cut open, so that the flesh may be removed from it, cut also the flesh from the opposite cheek, and supply its

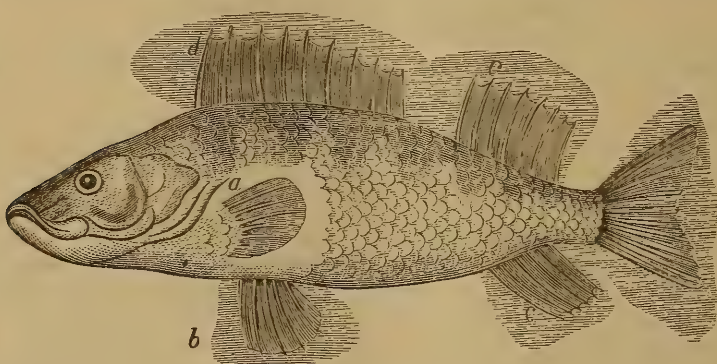


Fig. 56.—*Common Perch, showing application of the Paper.**

place by cotton. The skin must now be detached from the flesh, which will require some care at first. It must be commenced at the head, and separating it downward with the assistance of a knife, and the fin-bones must be cut through with scissors. The spine must now be cut through close to the head, and also at the tail, and the body removed.

All the animal matter having been completely removed from the skin, the inside must be wiped dry, and the preservative applied in the same manner as directed for birds and quadrupeds. Great care is necessary to prevent it from being too much distended.

In sharks and large fishes, an incision is made below the head, and extended to the fin of the tail; the skin is then separated on each side with a scalpel, cutting back as far as

*Description of Fig. 56.—The common perch, showing the manner in which the paper is attached for the purpose of extending the fins. a, pectoral fin; b, ventral fin; c, anal fin; d, first dorsal fin; e, second dorsal fin.

possible, so that the vertebræ may be cut close to the head. The tail is then skinned. The head is pushed inward, and the skin passed over it above, and all the cartilage cut carefully away. Care must be taken not to enlarge the branchial openings too much, which would render it necessary to sew them up again, and it is not easy to hide a seam in a fish's skin.

Diadon, *Tetradon* and *Balistes*, and their congeners, are opened by the belly. The *Ostracion* is enveloped in a skin, which consists of a single piece, the tail of which only is free and flexible. The opening in the belly must not be large; the tail must be opened, the flesh cut away, and stuffed with cotton.

STUFFING.

The skins being properly anointed, are filled with tow or cotton. This must be so managed that there will be no prominences on the outside of the skin, which, in fishes, is smooth and even for the most part. When properly filled, they must be sewed up, and set aside to dry in the air, but not exposed to the rays of the sun. In a few days, the papers with which the fins were extended are taken off, by damping them with a sponge. The glass eyes are now introduced, after filling the orbits with cotton and a little cement to secure them in their places. The skins may then be varnished, and laid aside to dry. Mr. Bullock, of the London Museum, always used turpentine varnish. Some specimens of his mounting have as much the appearance of the living subjects as any we have seen.

SHARKS.—In stuffing these large fishes, it is necessary to use a stick for a center support. This must also enter the head, through the opening of the throat. If it is intended that the specimen shall be suspended from the ceiling, wire-hooks must be fastened into the wood. From these must be placed upright wires, so that they penetrate the skin, and pass through the back. Let the whole internal surface of the skin be well rubbed with the preservative. The body is then stuffed to its full size, and afterward sewed up. The stuffing of the head must be completed through the orbits of the eyes, and also by the mouth. This finished, the glass eyes are inserted, as in other animals, and fixed by means of cement.

Many species of fish have semi-transparent cartilages connected with the eyes. These must be imitated with gum-arabic and powdered starch, as well as the cornea of the eyes.

The skins of all fish, which are similar to that of sharks, must be well supplied with spirits of turpentine, after they are mounted, more particularly the head and fins; but as they are not glossy, they do not require to be varnished.

When the fins are strong, it is necessary to keep them extended by means of a wire introduced through them.

The frog-fish, or fishing-frog, fig. 57, is easily preserved, as the colors are not so liable to change as in many other species.

Salmon, trout, tench, carp, pike, &c., are very easily preserved, as the scales are firmly attached to the skin; and although they become somewhat dim from drying, their colors and brilliancy are considerably restored by means of varnish, if applied before they are thoroughly dried.

After a lapse of time, the varnish will rise into little scales; to remove these, nitric acid, diluted in water, must be applied to the whole external surface, which has the effect of completely taking off the varnish, or at least of raising it from the skin, which, when allowed to dry, can be wholly removed by rubbing it with a small brush. It may then be varnished again; when dry, it will ever afterward continue quite solid.

The late Mr. Stuckbury had a method of preparing the fresh-water fishes of Britain, which was much admired at the

Fig. 57.—The Frog Fish or Fishing-Frog.

time. He skinned them under water, by which means he retained the scales in great perfection. But this method is too troublesome to be generally adopted.

What is above recommended will apply to almost all fishes; but where there is any difficulty, it must be left to the ingenuity of the operator.

Those travelers who do not wish to take the trouble of skinning fishes themselves, should preserve them in barrels of spirits. Each should be wrapped up in a separate piece of cloth, to prevent their scales being rubbed off by friction.

When travelers intend to preserve fish in spirits, they ought to provide themselves with casks of from four to ten gallons, well bound with iron hoops. An opening is cut near the bunghole, of the dimensions of six inches by four, of this shape *u*. The piece of wood cut out must be so beveled, out-

wardly, that it cannot fall into the cask, and must be used as a stopper, when the barrel has been filled with specimens. The fish put in should each be numbered with a small leaden ticket, or piece of wood, with the number turned or cut out, and corresponding notes taken of its locality, whether male or female, and of its name, if known, or the provincial name of the country, with any other circumstances connected with its history which can be procured. When the barrel is filled, the stopper must be put in, and hermetically sealed, to prevent the evaporation of the liquor.

If a female is procured, much swollen with spawn, an opening must be made at the anus, and the spawn extracted by it. The liquor must not be too strong, otherwise it will injure the colors of the fish. See the strength mentioned in the receipts.

Amateurs can preserve small specimens of fish very well by simply removing the entrails, eyes and brains, and powdering freely and thoroughly with alum or saltpeter on the flesh side, and allowing to dry with slow heat; having previously closed the opening by which the entrails were removed, and filling the interior with waste cotton. They may be fastened to thick card-board, with wire running through the fish and turned on the back of the card. Varnish can be applied afterward. We have even preserved small sturgeon by simple drying, without any preparation whatever, but these specimens are very liable to the attacks of small insects.

LOBSTERS, CRABS, &c.

Crabs, lobsters, and their congeners are all protected by a shell, which is easily preserved, although there is considerable difficulty in preserving the colors of some species.

The flesh must be extracted from the large claws of lobsters and crabs by breaking the smallest possible piece from their points and introducing a small crooked wire; in the smaller claws the flesh must be allowed to dry, and to facilitate this, extremely small perforations should be made in opposite sides of the shell by means of a sharp triangular awl, so as to allow the air to pass through it.

In lobsters the branchite and all the intestines must be cut away, the latter is effected by separating the body from the lower parts, and then extracting the internal parts with any sharp instrument; it should then be dried and cemented together, after being well anointed with the preservative. In crabs, the body with all the limbs attached, is pulled separate from the back shell, and the whole fleshy matter carefully picked out, and preserving powder and the solution of corrosive sublimate applied to the different internal parts. In drying lobsters, crabs, &c., they should be exposed to a free current of air, but not to the sun's rays, as it reddens the shells of crustaceous animals.

It need hardly be mentioned, that before applying the preservatives, the shells should be well washed with cold water.

The hermit crab always takes possession of the shell of some turbinated univalve as its domicile. These are easily preserved by pulling out the animal after it is dead. An incision is made in the soft tail of the animal, and the contents allowed to run off; it is then filled with cotton and imbued with the preservative, some cement is then put on the tail, and the animal returned to its shell, which completes the operation of preserving.

In sending home crustaceous animals, the larger species should be emptied of their fleshy matter, which, however, is not necessary with the smaller species; they should be packed in middling-sized cases, and each wrapped in separate papers, with a thick bed of cotton or flax between each. In lobsters, and the species which are allied to them, care must be exercised in preserving the tentacula or feelers which emanate from their heads, as these become very brittle after drying. When setting up specimens which have been sent home, they should be immersed in *cold* water for some time, to give pliability to the tentacula and other parts, without which it will be impossible to set them up in any way without their breaking.

Mr. Bullock recommended that crabs and all other crustaceous animals should be immersed in corrosive sublimate and water for an hour previous to their being put into attitudes.

When the joints become loose they are generally attached by glue, but the cement is much better.

N. B.—On no account whatever use *warm* water in cleaning crustaceous animals as it is certain to change their colors.

SERPENTS IN GENERAL.

SKINNING.—In skinning serpents there is some nicety required, to cut them so as not to disfigure the scales; the opening should be made in the side, commencing at the termination of the scales; and they should on no account be divided, as upon their number the species is mostly determined.

It is a very frequent practice to send home serpents without the head, which renders them quite unfit for any scientific purpose. This proceeds from the fear of receiving poison from the fangs. But there is not the slightest danger of being affected, as these can easily be cut out by means of pincers. The head should be cleaned and the brain removed, in the same manner as recommended for birds and quadrupeds, the skull anointed and then returned into the skin.

When the skin is removed, it may be rolled up and packed in a small space. The simplest way to preserve small species is to put them in spirits, which must not be too strong, as it will destroy the colors. [See department of Recipes.]

STUFFING.—The skin, if not recent, must be first softened in the manner recommended for birds, page 44. A piece of wire is taken the length of the animal, which must be wrapped round with tow till it is of a proper thickness, and above the whole, a spiral band or sliver should be carefully wrapped. It is then placed inside of the skin, and sewed up. The eyes are placed in, as directed for quadrupeds and birds. When dry give the serpent a coat of varnish, and then twist it into any attitude wished. A favorite and striking one is to have it wound round some animal, and in the act of killing it.

A simple but rather rough way of skinning a snake, where there are no scales, is the following: Open the mouth and separate the skull from the vertebral column, detaching all

Fig. 58.—Serpent's Head Prepared for Skinning.

surrounding muscles adherent to the skin. Next, tie a string around the stump of the neck thus exposed (fig. 58) and, holding on by this, strip the skin down to the extremity of the tail. The skin thus inverted should be restored to its proper state, and then put in spirit or stuffed, as convenient.

FROGS AND TOADS.

SKINNING.—The mouth is opened, and the first vertebra of the neck is cut. The whole inside of the mouth is cut out with scissors. The two jaws are next raised up, and the skin is pushed back with the fingers of the right hand; while the body is drawn back in a contrary direction with the other hand, and the whole body is then drawn out at the mouth. The legs are then returned to their proper place.

Lampreys, eels, and fish of similar form, may be skinned in the same manner as are frogs and toads, by drawing the body through the mouth.

STUFFING.—The simplest method of stuffing frogs and toads is with sand. A small funnel is placed into the mouth, and well-dried sand poured in. When full, a small piece of cotton is pushed into the throat, with some of the cement, to keep the sand from escaping on moving the animal,

The frog is then placed on a board, and in an attitude. When quite dry, give it a coat of varnish. When this has perfectly dried, very small preforations are made under the belly with the point of a needle, and the sand allowed to escape, leaving the body of its natural form.

These animals are liable to change of color from drying and should, therefore, be painted with the varnish to their natural hues. There is less difficulty with toads in this respect, as they are usually of a brown color, and not liable to much change. They may be perfectly preserved in spirits.

Mr. Burchell, in his four years' journey through Africa, glued the skins of the smaller serpents perfectly flat on paper, which preserved the size of the animal, and the skin retained all the beauty of life.

CROCODILES AND LIZARDS IN GENERAL.

Skinning.—All this tribe are skinned in the same manner as quadrupeds. Care is, however, required in skinning the tails of the smaller species, as they are very liable to break. The skin being of a dry nature requires but little of the preservative. After they are thoroughly dried they will keep a very long time without decay.

Stuffing.—Stuff them as directed for quadrupeds. They admit of but little variety of attitude. The small species are apt to change color in drying; the color should be restored with the colored varnishes, and afterward dimmed with sand paper. To keep them in their natural colors, they should be preserved in spirits. The skins of such as are glossy should be varnished after they are perfectly dry.

TORTOISES AND TURTLES.

Skinning.—The first operation is to separate the back and breast shells with a strong short knife, or chisel. If the force of the hand is inadequate, a mallet may be used, taking care not to strike so hard as to crack the shell.

These two bony plates being covered by the skin, or by scales, the scapula, and all the muscles of the arm and neck, in place of being attached to the ribs and spine, are placed below, from which cause the tortoise has been termed a retroverted animal. The vertebral extremity of the scapula is articulated with the shield, and the opposite extremity of the clavicle with the breast-plate, in such a manner that the shoulders form a ring for the passage of the trachea and œsophagus.

After the turtle is opened, all the flesh which adheres to the breast-plate, and also to the upper shell, is removed, while attention is paid to the parts as above described. The head, fore-feet, and tail are skinned as in quadrupeds; but

none of these must be removed from the upper shell, but left attached.

All these fleshy parts being removed, the shells are washed out with a sponge, and carefully dried. They are then slightly rubbed with the arsenical soap.

STUFFING.—Wires are now passed through the middle of the legs, after the skin has been rubbed with the preservative. The skull is returned to its place, and the whole of the head, neck, and legs stuffed with chopped flax or tow. The parts of the skin, which have been cut, are then sewed together. The back and breast plates are then united by four small holes, being bored at their edges, and united by strings or small wires. The junction of the bones may then be attached with the cement, colored so as to correspond with the shell.

If the calipash is dirty, it may be cleaned with a slight solution of nitric acid and water ; afterward clean washed, oiled, and then rubbed hard with a woolen rag, to give it a polish.

SHELLS, &c.

Cuttle-fish, and all other mulluscous animals, can only be preserved in spirits. The same observation applies to the animals which inhabit that numerous tribe called testaceous shells. They must be detached from the shells, and put into spirits, while the shells themselves must be preserved, independent of the animal.

Shells naturally arrange themselves under three distinct heads ; marine, land, and fresh water.

Marine shells are only to be expected perfect, when procured in a living state. The way to extract the animal, is to pour in some warm water on it ; but, if made too hot, it is liable to crack the shells. When the animals are dead, they can easily be pulled out with any hooked instrument, or fork, or, if the animal is small, by a common pin. This applies to all marine shells, whether univalve, bivalve, or tubular. It is of great consequence to preserve the ligament of bivalve shells entire, so that the valves may not be separated. The animals of land and fresh-water shells are killed by the same means, only that the water requires to be very hot.

Unless the shells are covered with any extraneous matter, it is not necessary to clean them. Marine shells are, however, very liable to be incrusted with other marine bodies, particularly with *Serpula* and *Balmi*, &c. These must be started off by means of a sharp instrument : an engraving tool is well adapted for this purpose. This must be done with great caution, in species which have spines and other excrescences. as they are very liable to be broken. Should any of the calcareous matter still adhere, this must be removed, by applying to it a *very weak* mixture of muriatic acid and water, ap

plied with the point of a quill, and then plunged into water, and allowed to remain till the acid is quite extracted. But on no account whatever, attempt to eradicate these parasitic bodies by means of acid, or acid and water, alone, as the chances are that the shell will be completely destroyed by their application. We have seen many fine and valuable shells destroyed by an injudicious application of acids—they should never be used when it can possibly be avoided. We have, on the other hand, seen shells which were so completely enveloped in calcareous crust, that it was impossible to trace their external surface, most thoroughly cleared of all this, without being touched at all by acids, the whole being removed by a small knife or other sharp instrument ; and these, in many cases having long and tender spines externally.

Nothing can be more monstrous than the application of pumice-stone, which some recommend, for polishing shells ; as is also the use of tripoli, rotten-stone and emery. Neither do we approve the application of varnishes, as such shells never have their natural luster.

If a shell has been found dead upon the beach, it is probable that it will have undergone a certain degree of decomposition, that is, it will have parted with some of its animal matter, and consequently the colors will have faded, and the surface present a chalky appearance. To remove this, take a small portion of sweet oil and apply it to the surface, when the colors which are invisible will appear. When completely saturated with oil, let the shell be rubbed dry, and placed in a cabinet. Oil may also be applied after acid has been used, and it will be found extremely useful, when applied to dry the epidermis, which it will prevent from cracking, or quitting the shell entirely, which it frequently does.

Whether marine shells are procured in a living or dead state, a very necessary precaution is to immerse them in pure tepid water, after the animal has been extracted, and allow them to continue in it for an hour or two, so as completely to extract any salt or acid which may be in them.

Fresh-water shells are liable to a calcareous or earthy incrustation, which must be removed by immersing them in warm water, and afterward scraping and brushing them with a nail-brush or tooth-brush. Much nicety is necessary in cleaning these, as their thinness renders them in general liable to be broken. A little sweet oil will improve the appearance of the epidermis, and render it less liable to crack.

Land shells seldom require any cleaning, except washing in water, as they are not liable to incrustations of any kind.

When shells are perforated by marine animals or otherwise broken, if the specimen is rare, it is desirable to remedy these defects as far as possible. They may be therefore filled up,

or pieces added to them with the cement, which may be colored when dry to imitate its original state.

OF POLISHING SHELLS.

Many species of marine and fresh-water shells are composed of mother-of-pearl, generally covered with a strong epidermis. When it is wished to exhibit the external structure of the shells, the epidermis is removed, and the outer testaceous coating polished down, till the pearlaceous structure becomes visible. It has been a common practice to remove the strong epidermis of shells by means of strong acids, but this is a hazardous and tedious mode of operating. The best method is to put the shells into a pan of cold water, with a quantity of quicklime, and boil it from two to four hours, according to the thickness of the epidermis. The shells afterward must be gradually cooled, and some strong acid applied to the epidermis, when it will easily peel off. Two hours are sufficient for the common muscle being boiled. The shells are afterward polished with rotten-stone and oil, put on a piece of chamois leather.

The epidermis of the *Unio margaritifera* is so thick, that it requires from four to five hours boiling. After the epidermis has been removed, there is beneath it a thick layer of dull calcareous matter, which must be started off with a knife or other sharp instrument; this requires great labor, but when accomplished a fine mother-of-pearl is exhibited, which adds an agreeable variety as a specimen.

Various *Turbos* and *Trochus* are also deprived of their epidermis, and polished with files, sand-paper, pumice-stone, &c., till the pearly appearance is obtained; but all these modes are invented for disfiguring rather than improving the shells in the eye of the naturalist, and should never be resorted to except where the species is very common, in which case it is well enough to do so with one or two specimens to show the structure of the shells.

After the operation of polishing and washing with acids, a little sweet oil should be rubbed over to bring out the colors and destroy the influence of the acid.

PART SIXTH.

The Collection and Preservation of Spiders, Insects, &c.

OF SPIDERS.

THE class *Arachnides* includes all animals of the spider kind. These were formerly arranged among insects, but have been formed into a separate class by Lamarck. The general instructions which we shall give regarding insects will apply to spiders, but there will be additional care required in regard to the bodies, a spider's body being very difficult to preserve, from its liability to shrink into a shapeless mass. To prevent this, the body should be pricked with the triangular awl, fig. 18, and the contents pressed out; it should then be stuffed with very fine carded cotton or down, which can be pushed in by a heckle tooth, or bodkin or probing-needle, figs. 19 and 20, blunted a little at the point. When properly distended, the small aperture should be filled with a little cement, or a solution of gum-arabic. The legs of the larger species, such as the bird-catching mygale (*Mygale avicularia*) and the scorpions, are also liable to shrink, and should be stuffed in the same manner as that of the body.

In those species of spiders which we have thus prepared, and whose colors are rich and likely to be affected by the action of the atmosphere, we must endeavor to arrest its progress by immediately imbuing the animal after it is set up with the solution of corrosive sublimate, and in an hour after with a thin coating of a very weak white-spirit varnish; for this purpose, take a teaspoonful of the ordinary white-spirit or elastic varnish, and add to it two spoonfuls of spirit-of-wine, apply this with a fine camel-hair brush, which will quickly dry, and have a strong tendency to preserve the color. The varnish being thus reduced in strength, will not leave any gloss on the insect, nor will it be at all perceptible.

Mr. Samouelle, author of *The Entomologist's Useful Compendium*, in speaking of preserving spiders, says: "The best preserved specimens that I have seen are those where the contents of the abdomen have been taken out and filled with fine sand. I have preserved several in this way, and find it to answer the purpose."

Mr. Donovan, author of *The History of British Insects*, and many other splendid and useful books on insects and natural history, makes the following observations on the preservation of spiders: "To determine whether some species of spiders could be preserved with their natural colors, I put several into

spirits-of-wine ; those with gibbous bodies soon after discharged a very considerable quantity of viscid matter, and therewith all their beautiful colors ; the smallest retained their form, and only appeared rather paler in the other colors than when they were living.

"During the course of last summer, among other spiders I met with a rare species ; it was of a bright yellow color, elegantly marked with black, red, green, and purple ; by some accident it was unfortunately crushed to pieces in the chip-box wherein it was confined, and was therefore thrown aside as useless ; a month or more after that time I observed that such parts of the skin as had dried against the inside of the box, retained the original brightness of color in a considerable degree. To experiment further, I made a similar attempt, with some caution, on the body of another spider (*Aranea diadema*), and though the colors were not perfectly preserved, they appeared distinct.

"From other observations, I find, that if you kill the spider and immediately after extract the entrails, then inflate them by means of a blowpipe, you may preserve them tolerably well : you must cleanse them on the inside no more than is sufficient to prevent moldiness, lest you injure the colors, which certainly in many kinds depend on the substance that lies beneath the skin."

Scorpions, and all the spider tribe, may be sent home in spirits, which will preserve them perfectly, and when taken out and dried, they will be found to have suffered nothing from their immersion. We have seen some specimens set up after being sent home in spirits, which rivaled any which have been preserved in a recent state. The animals of this class are particularly liable to the attacks of insects, particularly in warm countries, on which account, the mode of transporting and keeping them in spirits, is, perhaps, superior to all others. If, however, they are set up in a warm climate, they should be well soaked with the solution of corrosive sublimate, made according to the recipe of Mr. Waterton. [See chapter of Recipes.]

For the setting up of this class see the directions for preserving insects.

MYRIAPODA.

The mode, pointed out for the preceding class, and for insects, also applies to the class *Myriapoda*, containing gally worms, the *Scolopendra*, and others, which were formerly ranked as insects. They may also be sent home in the same way, or they may be set up as directed for insects.

OF COLLECTING INSECTS.

Preparatory to collecting insects, certain apparatus must be

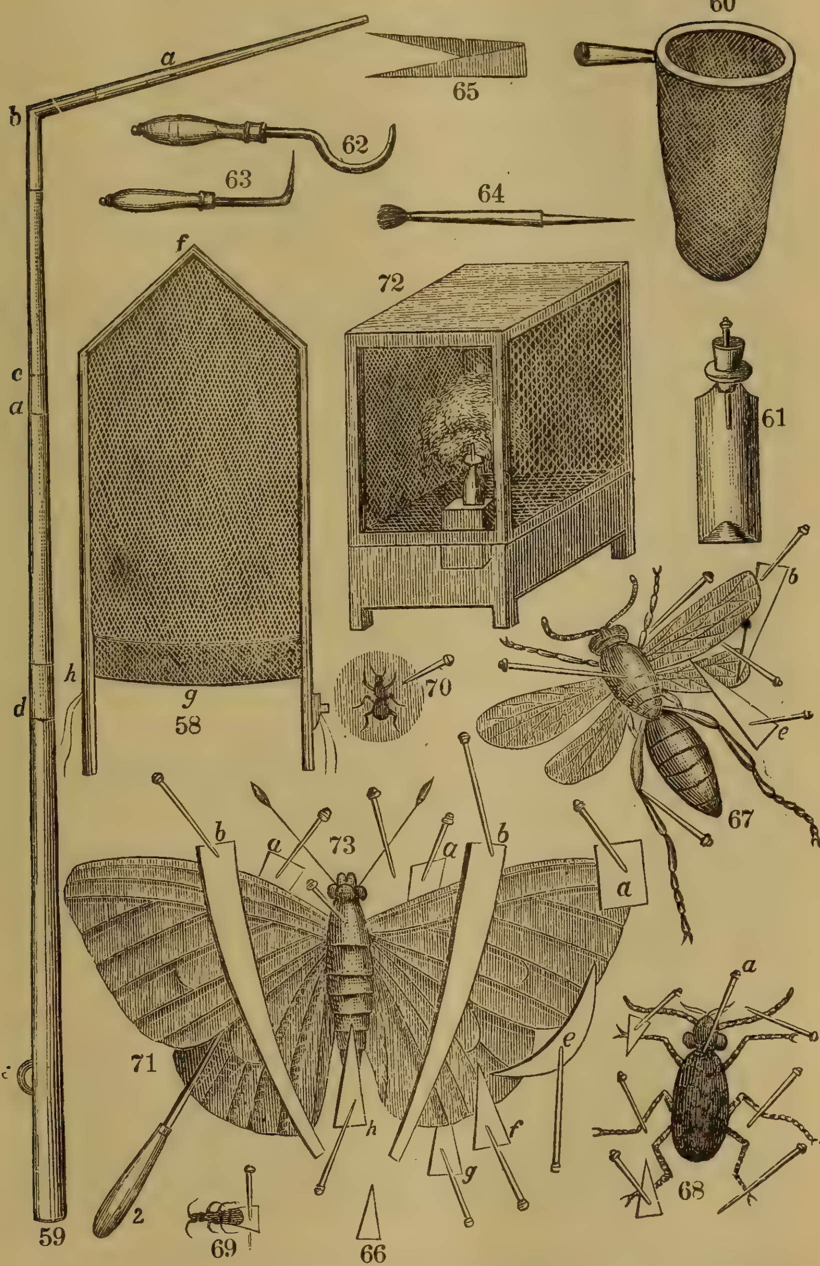
provided, not only to enable us to secure them, but also to preserve them after they are caught. First, we must be provided with a quantity of wooden boxes, from 18 to 20 inches long, 15 to 17 inches wide, and two inches deep. These should have well-fitted lids, with hinges, and fastened by a wire catch, or small bolt. The bottom should have a layer of cork, about the sixth of an inch in thickness, which should be fixed down with very strong paste made according to our recipe; and also some wire nails, to prevent it from springing. Over the cork should be pasted white paper. The box should be anointed inside with oil of petroleum. If that cannot be procured, make an infusion of strong aromatic plants, such as cinnamon, aloes, thyme, laurel, sage, rosemary, or cloves, and wash the inside with it. A small packet of camphor should be wrapped in a piece of rag and deposited in a corner of the box.

We must also be provided with a quantity of *insect pins*, of different sizes, corresponding with the size of the insect. The pins used for setting should be longer than those which are taken to the field.

Bottles, with mouths from an inch and a quarter to two inches in diameter, must also be procured, and these must be three-fourths full of spirits, such as weak brandy, rum, gin or whisky.

Hunting Box.—We must besides have what is termed a hunting box, for carrying in our pocket, when seeking after insects. This should be made of strong pasteboard, or chip, for lightness, or, if this is no consideration, of tin. It must be of an oblong-oval shape, rounded at the ends, for the convenience of the pocket. It should be from eight to ten inches long, four to five inches wide, and two and a half to three inches deep. It must have a layer of cork both in the bottom and top of the lid inside, for attaching insects to, when caught during the day. The larger insects are placed at the bottom, and the smaller ones on the lid.

The Entomological Net.—We next procure a net, fig. 58, constructed similar to a bat-fowling net. This is either made of fine gauze or coarse muslin; it may either be green or white—the latter is the best for observing small insects which may be caught; the green, however, is better adapted for catching moths. The net-rods should be made of hickory or beech; they ought to be five feet in length, quite round, smooth, and tapering to an obtuse point, as at fig. 59; the oblique cross-piece at the point fig. *a*, should be of cane, and fitted into the angular ferrule; the rod, marked *b*, must be divided into three or four pieces, so that it may be taken asunder and carried in the pocket; the upper part of each joint must have a ferrule affixed to it, for the purpose of articulating the other pieces, *d*. Each joint should have a notch or check, as marked at *c* to prevent the rod from twisting.



Figs. 58 *to* 73.—*Articles Used in the Collection and Preservation of Insects.*

The net itself, fig. 58, must have a welting all round it, doubled so as to form a groove for the reception of the rods. In the center of the upper part or point, at *f*, it must have a small piece of chamois leather, so as to form a kind of hinge; this must be bound round the welting, and divided in the middle, so as to prevent the cross pieces from slipping over each other; *g*, shows about four inches of the gauze turned up, so as to form a bag; *h*, *h*, are strings for the purpose of passing through the staple *e*, to which the net is firmly drawn on each side. When the net is used, a handle is to be held in each hand.

If it is intended to take insects on the wing, by means of this net, for which it is admirably adapted, it may be folded together in an instant. If the gauze is fine enough, and preserved whole, even the smallest insect cannot escape. It may be also applied in catching coleopterous insects, which are never on the wing, as well as caterpillars. When used for this purpose, the entomologist must hold it expanded under trees, while another must beat the branches with a stick. Great numbers of both insects and larvæ will fall in the gauze, and by this means many hnndreds may be captured in a day.

Another method is to spread a large table-cloth under trees and bushes, and then beat them with a stick. An umbrella reversed has frequently been used for the same purpose. Bosc, the celebrated naturalist, used this last method, he held the umbrella in the left hand, while he beat the bushes with the other.

The Hoop or Aquatic Net, fig. 60.—This net is used for capturing aquatic insects, which are either lurking at the bottom, swimming through the liquid element, or adhering to plants. It may also be successfully used in sweeping among grass and low herbage, for coleopterous insects, and others which are generally to be found in such situations. The socket, for the handle, may be made of such dimensions, as will answer the second joint of the entomological net-rod, which will save carrying another handle; or a walking-stick may be made to fit it.

Phial, fig. 61.—This may either be made of tin or glass, and used for collecting coleopterous and other creeping in-insects. The mouth should be nearly an inch wide, and a cork exactly fitted to it, in the center of which must be inserted a small quill, to afford air, and inserted about an inch beyond the cork, to prevent the insects from escaping. If the bottle is made of tin, and of a larger size, a tin tube must be introduced into its side, and terminating externally at the suface.

Digger, fig. 62.—This instrument is either made of iron or steel, and is about six or seven inches in length, fixed into a turned wooden handle. It is used for collecting the pupæ

of lepidopterous insects, at the roots and in the clefts of the bark of trees ; and also for pulling off the bark, particularly from decayed trees, under which many curious and rare insects are frequently found. It is most useful with an arrow-headed point.

Setting Needles, fig. 63.—Fitted into a small wooden handle, the needle itself should be about three inches long, and about the thickness of a small darning-needle, slightly bent from about the middle. Fig. 64, is a straight needle, which is used for extending the parts of insects ; at one end of the handle is the needle, and at the other a camel-hair pencil, which is used for removing any dirt or dust which may be on the insects. The pencil may be occasionally drawn through the lips, brought to a fine point, and used for disposing the antennæ and palpi of insects of the minute kinds.

Brass Pliers, fig. 65.—These are used for picking up small insects from the roots of grass, &c. They may also be used for laying hold of small insects, while they are yet free and not set up.

Quills.—These are of great use in carrying minute insects. They should be neatly stopped with cork and cement, at one end ; the other end should be provided with a small movable cork, for a stopper. Each end should be wrapped carefully round with a silk thread waxed, to prevent them from splitting.

Pocket Larvæ-Box.—For collecting caterpillars, this box is very essential : it consists merely of a chip-box, with a hole pierced in the center of the top and bottom, and covered with gauze, for the admission of air. It will be necessary to put into the box some of the leaves on which the larvæ feed, as they are very voracious, and cannot long exist without food.

Pill-Boxes.—No entomologist should be without five or six dozen of these useful articles. They are of great value in collecting the smaller species of lepidopterous insects such as the tinea, &c., and only one specimen should be put in each box, as, if more than one, they are apt to injure each other's wings, by beating against each other.

Setting-Boards.—These must be made of deal boards, from a foot to fifteen inches long, and eight or ten inches broad, with a piece of wood run across the ends, to prevent them from warping. They are covered with cork, which must be perfectly smooth on the surface, with white paper pasted over it. Several boards will be required, by persons who are making collections, as some of the insects take a considerable time to dry, so that they may be fit for introducing into a cabinet.

The boards should be kept in a frame made for the purpose. It should consist of a top, bottom, and two sides ; the back and front should have the frames of doors, attached by small hinges, and their centers covered with fine gauze, for the free

passage of air ; the sides should have small pieces of wood projecting from them, for the boards to rest on ; which should be at such a distance from each other, that the pins may not be displaced, in pushing the boards in, or drawing them out. The frame should be placed in a dry airy situation.

Braces.—These are merely small pieces of card, cut in the form illustrated by fig. 66. They are pinned down on the insects, to keep their wings, &c., in a proper state, till they acquire a set, as shown in the insects extended at the bottom of page 81, figs. 67, 68, 69 and 73.

Fan Forceps, fig. 74.—This very useful instrument to the entomologist, must be made of steel or iron, and about eight or ten inches in length ; its general construction is like that of a pair of scissors, and it is held and used in the same manner. Toward the points are formed a pair of fans, or hoops, which may either be square, oval, hexagonal, or octagonal in the edges, and the centers covered with fine gauze. The general size of the fans is from four to six inches. These are used for capturing bees, wasps, and *Muscæ.* They are also used for catching butterflies, moths, sphinxes. If an insect is on a leaf, both leaf and insect may be inclosed within the fans ; or if they are on a wall or the trunk of a tree, they may be very easily secured by them.

Fig. 74.—Fan Forceps.

If a butterfly, sphinx, or moth, is captured by the foreceps, while yet between the fans, it should be pressed pretty smoothly, with the thumb-nail, on the thorax or body, taking care, however, not to crush it. It may then be taken into the hand, and a pin passed through the thorax, and then stuck into the bottom of your hunting-box.

SETTING AND PRESERVING INSECTS.

Insects of the orders *Coleoptera*, *Orthoptera*, and *Hemiptera* are very easily preserved. They may all be speedily killed without injury, by immersing in scalding water ; they should then be laid upon soft blotting-paper, for the purpose of absorbing as much of the moisture as possible ; or they may be placed in a tin box, with a little camphor in it, near the fire, which soon kills them. This is besides of considerable effect in their preservation.

Insects of the cricket and locust kind have tender bodies, and are sure to shrivel in drying. The intestines should therefore be extracted, while they are yet moist, and the skin filled with cotton.

When coleopterous insects are set with the wings displayed, the elytra should be separated, and the pin passed through

their body, near the middle of the thorax, as in fig. 67. The wings are exhibited as in the act of flying, and are retained in this situation until they are quite dry, by the card braces, *a*. The insects of this order should always have a pin passed through the right elytra, on the right side, as shown at fig. 67, ***a***: that is, it should pass underneath, between the first pair of feet and the intermediate ones.

The legs, palpi and antennæ, should be displayed in a natural order on the setting-board, and retained in the position by means of pins and braces, as shown in figs. 67 and 68. These must be kept in that state, either longer or shorter, according to the insect and state of the weather, as if placed in a cabinet before they are quite dry, they are sure to get moldy, and will ultimately rot.

Minute insects should be attached to cards with gum, as shown in figs. 69 and 70, with legs and other organs displayed. Entomologists generally adopt triangular cards, as at fig. 66, as less liable to hide the parts of the insects.

MOTHS AND BUTTERFLIES.

When the large moths must be killed, destroy them at once by the insertion of a strong, red-hot needle into their thickest parts, beginning at the front of the thorax. If this be properly done, instead of lingering through several days, they are dead in a moment.

Butterflies are soon killed by passing a pin through the thorax; but probably the safest way is to use the red-hot needle. The pin passed through the thorax of small moths, generally proves almost instantly fatal to them.

The best manner of preserving the minute species of moths, is by pill-boxes, as above stated, each moth being kept in a separate box. The best method of destroying them is this: A piece of flat hard wood is taken, and a circular groove cut in it, sufficiently deep to admit the mouth of a tumbler being placed within it. In the center of the wood, pierce a hole about a third of an inch in diameter in its center; place the pill-box under this tumbler, with the lid off, and the insect will soon creep out; but whether it does so or not, a match well primed with sulphur is lighted and placed into the hole under the center of the tumbler, which will suffocate the insect in a few seconds. I have also found this an effectual method of killing the larger species of butterflies, and moths. In piercing them, the pin should be quite perpendicular, that no part of their minute frame should be hidden by its oblique position.

The larger insects of this order are set by braces chiefly. A single one should in the first place be introduced under the wing, near the thorax, as shown in fig. 71, and a longer brace extending over the wings, as at *b*, *b*. These should not bear

upon the wings, but be ready to rest gently on them, when required. The wings are now elevated to their proper position by the setting-needle *c*, and other braces are used as necessity dictates, in the manner represented at *d*, *e*, *f*, *g*, and *h*. The feet and antennæ are extended and kept in their places by means of pins; in which operation small braces are also occasionally used.

The French entomologists set butterflies, moths, and sphinxes, on a piece of soft wood, in which they have excavated a groove for the reception of the body, as deep as the insertion of the wings. They are otherwise preserved as above directed.

In the larger butterflies, moths, and sphinxes, the abdomen should be perforated, its contents extracted, and then stuffed with fine cotton, after having been washed internally with the solution of corrosive sublimate. Indeed, the cotton should also be rubbed with the arsenical soap before being introduced, as these insects are particularly liable to the attack of smaller insects, such as the mite.

Several of the moth tribe are extremely liable to change their color some time after they have been placed in a cabinet. This change is frequently occasioned by an oily matter which is common to many of them. This first makes its appearance in small spots on the body, but soon spreads itself over the abdomen, thorax, and wings; and ends in a total obliteration of all the beautiful markings. A method which has been sometimes successfully adopted is to sprinkle all the wings with powdered chalk, and holding a heated iron over it; the chalk absorbs the grease, and may then be blown off by means of a pair of small bellows. Another way of applying the chalk, and perhaps the better of the two, is to throw some powdered chalk on the face of a heated iron, and then put it into a piece of linen cloth, and apply it to the body of the insect; the heat of the iron will soften the grease, and the chalk will absorb it. Another way is to hold a heated iron for a few minutes over the insect, and then to wash the spotted or greasy places with ox-gall dissolved in water, applied with a camel-hair pencil, and afterward wash it with pure water, and dry it by the application of blotting-paper, and when perfectly dry imbue it with the solution of corrosive sublimate. But grease seldom appears where the contents of the abdomen have been removed.

DRAGON-FLIES, &c.

Dragon-flies are often difficult to kill, being powerful and nervous animals. When caught they should be transfixed through the sides, and it sometimes becomes necessary to put braces on their wings to prevent them from fluttering while in the hunting-box. The only certain method of killing them speedily is by the hot needle. They may also be killed some-

times by placing them under a tumbler and suffocating them with vapor of tobacco or sulphur. Some entomologists put them in scalding water for an instant, and some with whisky or alcohol.

The contents of the abdomen should always be removed from dragon-flies, otherwise it will become black and shining through the skin, and destroy the beautiful bands with which they are ornamented. They can be stuffed with cotton or a small roll of paper introduced. If these precautions are attended to, the insect will preserve the perfect beauty of its living state.

The other species of the orders *Neuroptera*, *Hymenoptera*, and *Diptera*, soon die after being transfixed. They may be set by braces and pins, as represented in figs. 67, 68 and 71.

Some two-winged insects are very perishable in point of color after death, particularly in the abdomen, the skin of which is very thin. The only way of remedying this is to pierce the abdomen, and after taking out the contents the cavity it should be filled with powdered paint the same color as the living subjects, which will shine through and give it all the appearance of nature.

METHOD OF RELAXING DRIED INSECTS.

Insects frequently get stiffened before the entomologist has leisure to get them set; and it usually happens that those sent home from foreign countries have been ill set, and require to be placed in more appropriate attitudes after they have fallen into the hands of the scientific collector. They may be relaxed and made as flexible as recently killed specimens by the following simple process, from which they can receive no injury: Pin them on a piece of cork and place the cork in a large basin or pan of tepid water, and cover the top tight with a damp cloth, taking care that it is sufficiently high not to injure the insects. In most cases a few hours is sufficient to restore them to their original flexibility, so that they may be easily put in their proper positions. In some instances, three or four days are necessary to relax them thoroughly, so as to set the wings without the risk of breaking them; no force whatever must be used with any of the members. When set up after being relaxed, they must be treated in exactly the same manner as recent specimens.

We must again caution the entomologist to be careful that he applies the solution of corrosive sublimate to all his specimens, otherwise there is little chance of their continuing long without being attacked by the mite; they ought to be frequently imbued.

Mr. Waterton, who has studied deeply the subject of preserving animal substances, and applied them not alone in Great Britain, but under the influence of a tropical climate

makes the following observations upon the preservation of insects: "I only know of two methods," says he, "to guard preserved insects from the depredations of living ones. The first is, by poisoning the atmosphere—the second is, by poisoning the prepared specimens themselves, so effectually, that they are no longer food for the depredators. But there are some objections to both these modes; a poisoned atmosphere will evaporate in time if not attended to, or if neglected to be renewed; and there is a great difficulty in poisoning some specimens on account of their delicacy and minuteness. If you keep spirits of turpentine in the boxes which contain your preserved specimens, I am of opinion that those specimens will be safe as long as the odor of the turpentine remains in the box, for it is said to be the most pernicious of all scents to insects. But it requires attention to keep up an atmosphere of spirits of turpentine; if it be allowed to evaporate entirely, then there is a clear and undisputed path open to the inroads of the enemy; he will take advantage of your absence or neglect, and when you return to view your treasure you will find it in ruins. Spirits of turpentine poured into a common glass inkstand, in which there is a piece of sponge, and placed in a corner of your box, will create a poisoned atmosphere and kill every insect. The poisoning of your specimens by means of corrosive sublimate in alcohol, is a most effectual method. As soon as the operation is properly performed, the depredating insect perceives that the prepared specimen is no longer food for it, and will for ever cease to attack it; but then every part must have received the poison, otherwise those parts where the poison has not reached will still be exposed to the enemy, and he will pass unhurt over the poisoned parts till he arrives at that part of your specimen which is still wholesome food for him. Now, the difficulty lies in applying the solution to very minute specimens without injuring their appearance; and all that can be said is, to recommend unwearied exertion."

Mr. Waterton is of opinion, that tight boxes, with aromatic atmospheres, are not to be depended upon, in the preservation of insects. He says: "The tight boxes, and aromatic atmospheres, will certainly do a great deal, but they are liable to fail, for this obvious reason, viz., that they do not render forever absolutely baneful and abhorrent to the depredator, that which in itself is nutritious and grateful to him. In an evil hour, through neglect in keeping up a poisoned atmosphere, the specimens collected by industry, and prepared by art, and which ought to live, as it were, for the admiration of future ages, may fall a prey to an intruding and almost invisible enemy; so that unless the solution of corrosive sublimate in alcohol is applied, you are never perfectly safe from surprise; I have tried a decoction of aloes, wormwood, and

walnut leaves, thinking they would be of service, on account of their bitterness; the trial completely failed."

Many entomologists are satisfied with possessing the insect in its perfect, or imago condition. But it is exceedingly interesting to be able to trace these through their different stages of existence, from the egg to the perfect insect. Besides, we are certain to produce the insects in the highest state of perfection, when we breed them ourselves; and it is, besides, very interesting to have the eggs of the different species, as well as the caterpillar and pupa.

THE EGGS OF INSECTS.

The eggs of insects preserve their form and color in a cabinet, in general without much trouble. Swammerdam had a method of preserving them, when they appeared to be giving way. He made a perforation within them, with a fine needle, pressed out their contents, afterward inflated them with a glass blowpipe, and filled them with a mixture of resin and oil of spike.

THE LARVÆ, OR CATERPILLARS.

The easiest way of destroying the caterpillar is by immersion in spirits-of-wine. They may be retained for a long time in this spirit, without destroying their color.

Mr. William Weatherhead had an ingenious mode of preserving larvæ. He killed the caterpillar as above directed, and having made a small puncture in the tail, gently pressed out the contents of the abdomen, and then filled the skin with fine dry sand, and brought the animal to its natural circumference. It is then exposed to the air to dry, and it will have become quite hard in the course of a few hours, after which the sand may be shaken out at the small aperture, and the caterpillar then gummed to a piece of card.

Another method is, after the entrails are squeezed out, to insert into the aperture a glass tube, which has been drawn to a very fine point. The operator must blow through this pipe, while he keeps turning the skin slowly round, over a charcoal fire; the skin will soon become hardened, and after being anointed with oil of spike and resin, it may be placed in a cabinet, when dry. A small straw, or pipe of grass, may be substituted for the glass pipe. Some persons inject them with colored wax, after they are dried.

THE PUPA.

When the insects have escaped from their pupa skin, the skin usually retains the shape and general appearance it did while it contained the insect. It is therefore ready for a cabinet, without any preparation whatever. But if the animal

has not quitted its envelope, it will be necessary, either to drop the pupa into warm water, or to heat it in a tin case before the fire; the former mode however is the best, and least liable to change the colors of the pupa.

METHOD OF BREEDING INSECTS.

Breeding Cages.—These must be made of chestnut, or any hard wood, as pine is apt to kill the caterpillars, from its strong smell of turpentine. The best form for these, is represented in fig. 72. The sides and front are covered with gauze; *a*, is a small square box, for the reception of a phial of water, for placing the stalks of plants in, which it is intended the caterpillars are to feed. The most convenient size for a breeding cage is, eight or ten inches in breadth, four deep, and one foot in hight. It is not proper to place within a cage more than one species of caterpillar, as many of them prey upon each other. Indeed animals of the same species will devour each other, if left without food. The caterpillars of insects, for the most part will only eat one particular kind of food, so that it is better to have no more than one sort in a cage.

There must be at the bottom of the cage earth to the depth of two inches; this should be mixed with some fine sand and vegetable mold, if possible, to prevent it from drying. The cages should be kept in a cool cellar or damp place, because many insects change into the pupa condition under the earth; so that it would require to be somewhat moist, to prevent the destruction of the animal. The shell or case of the pupa also becomes hard, if the earth is not kept moist; and, in that event the animal will not have sufficient strength to break its case, at the time it ought to emerge from its confinement and must consequently die, which but too frequently happens from mismanagement.

Some seasons are more favorable than others for the production of caterpillars, and to keep each kind by themselves would require an immense number of cages, as well as occupy much time in changing the food, and paying due attention to them. To obviate this, some persons have large breeding cages, with a variety of food in them, which must be cleaned out every two days, and fresh leaves given to the caterpillars; as, on due attention to feeding, the beauty and vigor of the coming insects will much depend.

The larvæ of insects, which feed beneath the surface of the earth, may be bred in the following manner: Let any box, that is about three or four feet square, and two or three feet deep, be lined internally with tin, and a number of very minute holes be bored through the sides and bottom. Put into this box a quantity of earth, replete with such vegetables as the caterpillars subsist on, and sink it into a bed of earth,

so that the surface may be exposed to the different changes of the weather. The lid should be covered with brass or iron net-work, to prevent their escape, and for the free admission of air.

Cabinet.—Such is the advanced state of entomological science, that a collection of British insects requires a cabinet of from 50 to 100 drawers, which are generally about fourteen or fifteen inches in length, eighteen in breadth, and about two inches deep. The bottoms should be lined with cork, o about the sixth of an inch in thickness. It must be chosen as free from cracks and knots as possible. Each drawer must have a lid of glass, and an edge of wood very nicely fitted, so as to prevent, as much as possible, the admission of air or dust. This lid must rest on a rabbit.

The young entomologist should obtain a cabinet of about thirty drawers, arranged in two tiers and covered in with folding doors. There is a great convenience in this size, as the cabinet is rendered more portable, and at the same time admits of having another of the same size being placed above the top of it, as the collection increases, without injuring the uniformity, and thus the drawers may be augmented to any extent. It is immaterial whether the cabinet is made of mahogany or walnut; sometimes they are constructed of cedar-wood, but seldom of pine, or any other soft wood. Small cells must be made in the inside of the fronts, for camphor.

Corking of Drawers.—The simplest way to get the cork is to purchase it of a cork-cutter, ready prepared, but it will be much cheaper for the entomologist to prepare it himself. In this case, it should be cut into strips, of about three inches wide, with a cork-cutter's knife, to smooth the surface and to divide it. The strips should be fixed in a vise, and cut to the thickness required with a fine saw; but grease must not be used in the operation, as it will not only prevent the cork from adhering to the bottom of the drawer, but will also grease the paper which should be pasted on its surface. The black surface of the cork should be rasped down to a smooth surface. After having reduced the slips to about three-quarters of an inch in thickness, the darkest, or worst, side of each slip should be glued down to a sheet of brown, or cartridge, paper; this should be laid on a pine board, about three feet in length, and the width required for a drawer or box; a few fine nails, or brads, must be driven through each piece of cork, to keep it firm and in its place, until the glue be dried: by this means sheets of cork may be formed the size of the drawer. All the irregularities are filed or rasped down quite to a level surface, and then polished smooth with pumice-stone. The sheet, thus formed and finished, is glued into the drawers. To prevent its warping, some weights must be equally distributed over the cork, that it may adhere firmly to the bottom of the drawer. When quite dry, the weights are removed, and the

cork covered with fine white paper, but not very thick. The paper is allowed to be quite damp with the paste before it is placed on the cork, and, when dry, it will become perfectly tight.

Insect cabinets should be kept in a very dry situation, otherwise the antennæ, legs, &c., will become quite moldy. The same evil will ensue if the insect is not perfectly dry, before it is placed in the cabinet. Should an insect be covered with mold, it can be washed off with a camel-hair pencil, dipped in camphorated spirits-of-wine ; in which case, the insect must be dried in a warm or airy situation, before being placed in the cabinet.

There should always be plenty of camphor kept in the drawers, otherwise there is great danger to be apprehended from mites ; where these exist, they are easily discovered by the dust which is under the insects by which they are infested; in which case, they must be immediately taken out, and rubbed clean with a fine camel-hair pencil, and well imbued with the solution of corrosive sublimate, and then placed near a fire, taking care, however, that too great a heat is not applied, as it will utterly destroy the specimen. The butterfly sphinx, and moth tribes are extremely liable to the attack of mites, and should therefore be frequently examined.

Store Boxes.—The neatest manner of constructing these, is to have them about a foot square, the top and bottom about two inches deep, on the same principle as backgammon boards, the inside being lined with cork.

STAR-FISH.

Those star-fish which have fragile crustaceous tentacula, are difficult to preserve. They must first be immersed in fresh water for four or five hours, and then extended on a plank of soft wood ; the rays must be properly arranged, and pins used to keep them so, till they are quite dry. These are stuck into the plank, alongside the rays, and not into the rays themselves. They must not, however, be placed near a fire, or in the rays of the sun, as in either case, they will have a tendency to change their colors. It is almost invariably found that all colors in the crustaceous coverings of animals become reddish by exposure to the heat of the sun or of a fire.

The larger kinds should have the flesh cut out of the inside of the rays, and a little of the dry preservative applied to them. The species called medusa's-heads undergo the same preparation as other star-fish, only that much caution is required.

When these are packed, they will require great attention. The larger kinds should be wrapped in fine and soft paper and the smaller ones packed between layers of cotton, as all the parts are very brittle.

SEA-URCHINS.

There is a great difficulty in preserving these animals, in consequence of the spines with which they are invested, principally from the care required in retaining the natural positions, the spines of which are, in many species, pointed in all directions. This is particularly the case with those of the genus *Cidarities.* These animals inhabit the Mediterranean and Indian seas, and are distinguished by the shells having large tubercles, pierced with holes, for a muscular cord which moves the spines. These spines are extremely large, solid, and heavy, and are very liable to fall off, even from their own weight while drying.

The anal opening should be a little enlarged, a small spatula introduced, and the whole intestines removed; it should then be immersed in fresh water for a quarter of an hour, taking care to preserve the spines. When taken out, fill the shell with cotton; the shell should then be placed on a plank to dry, and between each spine a pad of cotton, to prevent the weight of the shell resting on the spines, and also to keep those on the upper surface in their proper place, and so that they may all radiate from the body of the shell.

In sending them home, each should be separately packed, retaining the cotton between the spines, placing them in a box, so that they cannot rub against each other, and with a thick padding of cotton between each. Small species should be placed in little boxes, and packed as above directed.

Nothing is more difficult than to preserve entire the spines of these large shells, and it is seldom that the larger species can be kept complete. But these can be again fixed, if they have fallen off. The whole spines of the *Echini* and *Spatangi* are seated on small tubercles. A little hole must be drilled in the end of each spine, at its base, with a triangular awl, or a saddler's awl, to the depth of about a quarter of an inch; a needle, or very fine wire is introduced into the perforation after it has been filled with cement. The shell of the *Echinus* must now be filled with melted bees'-wax: care is taken to stop up the openings, while in the act of pouring in the melted wax. When the wax has cooled, a hole is bored in each tubercle, for the reception of the needle, which must first be warmed at a lighted candle, and the wax on cooling holds the needle firmly in its place.

A better plan, however, than the above is, to use very fine wire which ought to be bent as nearly at right angles as possible, before being introduced; and, having filled up the vacancies of one side in this way (always leaving as much outside as will fit into the perforation made in the base of the spine), pour in some cement, made as thin as it will flow easily, and then set it aside to dry. Repeat the same opera-

tion with the other side; and, when dry, the spines may be placed on the projecting wires with cement, as above directed. The wire which is left outside should be roughened with a file here and there, previous to its being inserted, so that it may the better retain its hold in the cement.

CORAL, &c.

Zoophites, or corals, generally live in families or congregated masses. Their axis is of a horny consistence, generally hard, and disposed in layers; their surface is usually furnished with small spines covered by a gelatinous substance. The axis of the *Gorgona* is also of a horny consistence, and the fleshy matter by which it is covered contains detached particles, that are very friable in nearly the whole species. These are first placed, for an hour or two, in fresh water, and then dried, while the branches are held open. The same method is adopted with the *Pennatulæ*, or sea-pens.

There is no difficulty in preserving the calcareous covering of the various madrepores, &c.; all that is necessary is to immerse them in fresh water for some hours, so as to extract the salt, and then dry them thoroughly.

In packing the small kinds, they may simply be placed in cotton; but the ponderous and heavy ones should be fixed to the bottom of the case which is to contain them. This is done by passing cords between the branches at the base, and bringing these through holes bored in the bottom of the box, and fixed outside with nails. The feet of the madrepores have sometimes large openings, in which case, advantage is taken of them, to introduce pieces of wood into these natural apertures, and then nailing them to the bottom of the case.

We have known many fine specimens of all kinds brought home, by gluing them to the sides and bottoms of packing-boxes; and, when removed, the packing-box is taken to pieces, and floated in water to moisten the glue, and the specimens can easily be taken off.

Sponges require merely to be soaked in fresh water and dried. No care is necessary in packing them.

Infusoria, *Entozau*, *Alcalepha* and other minute or soft-fleshed sea animals cannot be set up by the taxidermist.

PART SEVENTH.

Of the Preparation of Natural and Artificial Skeletons.

GENERAL REMARKS.

AS much of the flesh should be removed from bones intended for preparation as possible with the scalpel, but it is not required that they should be separated from each other, more than is necessary for placing them in a vessel for the purpose of maceration. The bones are to be entirely covered with water, which should be changed every day for about a week, or as long as it becomes discolored with blood; after which, allow them to remain in water without changing till putrefaction has thoroughly destroyed all the remaining flesh; this will require from three to six months in our climate, according to the season of the year or temperature of the atmosphere. In tropical climates, fourteen days will be sufficient to disengage the flesh completely from the bones.

The large cylindrical bones of the thighs and arms should have holes bored in their extremities of the size of a goose quill, to give the water access to their cavities, and a free exit to the medullary substance.

As the water will gradually diminish in quantity from evaporation, more should be added from time to time, so that none of the bones, or any part of them, may remain uncovered, as by exposure to the atmosphere they would become of a dirty color, and have a disagreeable appearance. To be free from such stains, is considered a great beauty in skeletons.

In towns, the macerating vessels should always be closely covered, as from neglecting this, the water is apt to get mixed with particles of soot, and other impurities, which have a strong tendency to blacken the bones. When the putrefaction has destroyed the ligaments, the bones are then fit for cleaning, which is done by scraping off the flesh, ligaments, and periosteum. When this is effected, the bones should be again laid in clean water for a few days and well washed; they ought then to be placed in lime-water, or a solution of pearl-ash, for a week, when they may be taken out to dry, after having soaked them five or six hours in pure water, to remove the solution of pearl-ash, which would act upon their surface when exposed to the atmosphere.

In drying bones they should not be exposed to the rays of the sun, or to a fire, as too great a degree of heat brings the remaining medullary oil into the compact substance of the bones, and gives them a disagreeable oily transparency. This is the great objection to the process of boiling bones, for the

purpose of making skeletons, as the heat applied in that way has the same effect, unless they are boiled in a solution of pearl-ash, which some are of opinion is one of the most effectual methods of whitening them by its effectually destroying the oil. But there can be but little doubt that bleaching is, of all methods, the more effectual where it can be done to its greatest advantage, namely, in a pure air, and more especially on a sea-shore. It is much more difficult to clean the bones of animals that have died in a good condition than those that are lean and reduced by disease.

OF NATURAL SKELETONS.

Natural skeletons are made without separating the bones from each other, in which case all the animal ligaments are allowed to remain entire. This plan is usually adopted only with young and small animals, because the ligaments when dry, being divested of their natural flexibility, occasion an inconvenience, as the different extents and varieties of motion cannot be shown in the different articulations.

In making these, we are first to remove from the bones the skin, muscles, tendons, and viscera, and, in short, everything except the connecting ligaments and cartilages, which ought to be carefully preserved. This is done without any regular order of dissection; neither in this part of the process need any attention be paid to making the bones clean. The brain may be removed through an opening in the large fontanel, if the subject is very young, if not, a perforation may be made with the trephine for that purpose. Some separate the head from the spine, so that the brain may be more easily removed by the occipital hole. The skeleton is put in water and allowed to remain for several days, it is then taken out and more thoroughly cleaned by a knife, forceps, and scissors, and replaced in fresh water. This is repeated from day to day, constantly changing the water, the object being to preserve the ligaments fresh and transparent. It is of great consequence to work hard by daily scraping and scrubbing until the bones are deprived of their blood and oleaginous matter and become white and clean, then remove them into clean lime-water, or solution of pearl-ash, for two or three days to take off any greasiness, and give a more beautiful white. When they have laid long enough, wash them with clean water ; they are then placed in a position, by the assistance of a frame or piece of wood and wire, exposing them to a current of air. When perfectly dry, they may receive a coating of copal or mastic varnish.

It must be kept in view, that if the preparation is allowed to remain too long in the state of maceration, the ligaments themselves will be destroyed by putrefaction, and the intention of procuring a natural skeleton defeated.

An excellent and simple way of procuring natural skeletons of mice, small birds, and fish, is to put them into a box of the proper size, in which holes are bored on all sides, and then buried in an ant-hill. The ants will enter numerously at these holes and eat away all the fleshy parts, leaving only the bones and connecting ligaments; they may be afterward macerated in clean water for a day or two to extract the bloody color, and to cleanse them from any dirt they may have acquired, then whitened by lime and alum-water, and dried in frames or otherwise, as may be most convenient. In country situations wasps may be employed in this service; these are most voracious animals, and if a skeleton is placed near one of their nests, or in an empty sugar-cask, where they resort in plenty, they will perform the dissection with much greater expedition, and equally well as the ants. Wasps have been known to clean the skeleton of a mouse or small bird in three or four hours, while ants would require a week to effect it.

When the animal is of a large size, the ligaments are sometimes unable to sustain the weight of the bones, in which case an iron wire, of sufficient thickness, is passed through the center of the back-bone, which must pass out anteriorly, so as to fix the head to the cervical vertebræ. It is made in the form of two forks, the one for the support of the interior, and the other for the exterior part; for this purpose two pieces of iron wire are taken the length of the skeleton; they are twisted together, leaving a fork at each extremity, and are then both fixed to the board on which the skeleton is to be placed. One of these should enter the ribs and encompass the back-bone, between the scapular bones of each shoulder, the other two should pass between the bones of the pelvis.

It not unusually happens that pieces of the skeleton detach one from another, in which case, two holes are bored in the ends of the bones, which are separated, and are reunited by means of small brass wires.

OF ARTIFICIAL SKELETONS.

Skeletons of man and animals of a middling and large size, cannot be made in the manner described for natural skeletons. In this case, the bones, covered by the flesh, are immersed in water and allowed to remain without changing, until the soft parts begin to get putrid, when the animal matter is easily removed; and by repeating the maceration two or three times, it may all be completely abstracted. The duration necessary for the first maceration will depend upon the state of the atmosphere, being always much shorter in summer than winter.

After the fleshy matter has been completely freed from the bones, they should be exposed on the roof of a house, or other convenient situation, until they are rendered quite white, and free from grease.

The fat in bones bears a close resemblance to the fixed oils. In the bones of whales it exists fluid like oil. In the long bones of oxen, horses, and other large quadrupeds, it is semi-fluid, constituting the marrow. When, therefore, this is present in considerable quantity, the process may be much accelerated by drilling holes with a gimlet, or other instrument, in the opposite ends of the bones, and injecting by means of a syringe, a tepid solution of pearl-ash, the potash combining with the oleaginous matter, forming a kind of soap, which being soluble in water, is easily removed. Chloride of lime is also employed for the same purpose.

The relative proportion of earthy and animal matter varies according to the nature of the bone, and the purposes it is intended to serve. The bones of quadrupeds and birds contain a much greater proportion of earthy matter than those of reptiles and fishes, and hence are more easily cleaned. Here it may be remarked, that the color of bones varies in different animals. In some common fowls it approaches to a dark yellowish brown. Food exercises considerable influence on the color, as is demonstrated in animals which feed on madder.

When the bones are perfect and dry, they are connected by means of wire and screws, &c. This is the most difficult part of the operation, as it requires considerable skill to reassemble the bones, so that they may be placed in their natural order and position. The operation is begun at one of the extremities, by making holes in the apophysis, or round ball of the bone, fig. 75. This is effected by means of a drill or a lathe, or with a gimlet, although this instrument has hardly sufficient power for perforating so hard a substance as bone.

Fig. 75.

The bones are then attached to each other in their natural order, with annealed iron wire, or brass wire, by means of the perforations which have been made. The ends of the wire should be twisted, and not too firmly, but sufficient to allow a little play between the articulation; this mode to be pursued till the whole wires are put together. They are then ready for placing on a board, and are kept erect by one or two perpendicular bars of iron, suited to the weight of the skeleton. In the larger species of birds, one support is necessary; it is passed through the breast-bone, and attached under the spine, as represented in the skeleton of the goshawk, fig. 2. The position of this support must be varied according to the attitude in which the skeleton is to be placed.

In skeletons of the horse, the ox, the hippopotamus, the rhinoceros, the camel, and the elephant, the links of wire which we have above described, are insufficient to unite their bones; for these, two iron pegs are used with a head at one end, and a screw at the other. Each screw is provided with a

nut, and each pair of screws must have a narrow plate of iron bored at each end to pass the screw through. Supposing the bones of the leg and thigh, of a large quadruped, are to be united, a hole is bored through the apophysis, about two inches from the extremity, and the same having been done with both leg and thigh bones, they are brought together, and one of the screws passed into one of the holes of the plates which we have mentioned, and then through the perforations in the bone, and lastly into the other plate ; they are tightened together by means of the nut. The screws should be nearly an inch longer than the thickness of the bones. The two ends of the bones are thus united and supported by the two plates which are kept together by the screws. Provision must be made for the play of the bones, by leaving a sufficient distance in boring the holes, through which the pegs are passed. This we have represented in fig. 76, showing one iron plate and one nut, by which the screws of the iron peg are tightened, the head of the other iron peg, the nut and screw of which are placed on the opposite side.

The horse and other large animals require a double bar to support them, as represented in fig. 1, page 8. A bar is also passed through the vertebræ of the neck, spine, and tail, and the ribs are attached by means of wires, or flat pieces of plate iron.

In these larger animals, the heads are for the most part sawn through, for the purpose of studying the structure of the internal cavity and partitions. These are kept together by means of a hinge, so that they can be opened and shut at pleasure.

PART EIGHTH.

Of the Chase, and the Manner of Collecting Animals, &c.

QUADRUPEDS AND BIRDS.

IT is hardly necessary to recommend a double-barreled gun. One of the barrels should be loaded with small shot, or dross of lead or sand for small birds, and the other with large shot. These should have much less powder than an ordinary charge, so as not to tear and injure the animals. Paper, cotton, or flax, and powdered dry earth or ashes should form part of the naturalist's stores.

When a bird is killed, a small quantity of dry dust is put on the wound. For this purpose, the feathers must be raised

with a pin, or a gun-picker, close to the wound. The bill of the bird should have a small quantity of cotton or flax introduced into it to prevent the blood from flowing, and spoiling the plumage. The feathers must be all adjusted, and the bird then placed on the ground to allow the blood to coagulate. Every specimen should be placed in a piece of paper of the form of a hollow cone, like the thumb-bag used by grocers. The head should be introduced into this, the paper should then be closed around the bird, and packed in a box filled with moss, dried grass, or leaves.

Birds taken alive in nets and traps are to be preferred to others for stuffing, and also those caught by bird-lime, which must be removed by spirits-of-wine.

Birds should always be skinned the same day they are killed. or next day at farthest, particularly in summer, as there is a danger of putrefaction ensuing, by which the feathers will fall off. However, in winter there is no danger for some days; but in tropical climates they must be prepared soon after they are killed. The same observations apply generally to quadrupeds.

Bats and owls are caught during the day, in the hollows of aged trees, in the crevices of walls, and ruins of buildings. These are animals which, it may be presumed, are still little known in consequence of their nocturnal habits.

Those who prepare for the chase, with the intention of preserving animals, should take care to provide themselves with implements necessary for fulfilling the objects advantageously. The articles most needful are one or two pairs of large pincers, scissors, forceps, scalpels, knives, needles, thread, and a small hatchet, as well as one or more canisters of preserving powder, some pots of arsenical soap, or arsenical composition, and some bottles of spirits of turpentine. If in America, cotton may be employed in stuffing the skins, and therefore a considerable quantity should always be taken along with the naturalist. In parts of Asia and Africa where this cannot be procured, tow must be employed, or old ropes teazed down; and where even these cannot be found, dried grass and moss may be used. M. Le Vaillant used a species of dog-grass while in Africa, which is very abundant in that country and it answered the purpose remarkably well.

It being supposed that a traveler has an ample caravan, provided with all the necessaries which we have pointed out, and having killed a quadruped, he will skin it immediately, according to the method which we have pointed out in the preceding page. He will then sew up the skin after receiving a partial stuffing, and having been anointed with the arsenical soap, or composition. All the extremities must then be imbued with spirits of turpentine, and the skin should be placed in some convenient place to dry, so that it may have the advantage of complete exposure to the air. The turpentine

must be again applied at the end of three or four days, more especially around the mouth of the quadruped.

It will be of the utmost advantage to remain a week or ten days at one place; by which means the naturalist will have had time to render himself somewhat acquainted with the animals which localize in that neighborhood. And as some species frequently confine themselves to a very limited spot, by leaving the place too hurriedly he is apt to overlook them.

After the traveler has determined on leaving his cantonment, he must see that all the objects he has collected are in a condition to be removed. He must examine carefully each specimen, and see that they have not been attacked by the destructive insects, so abundant in warm climates. Should flies have deposited their eggs in the lips of the quadrupeds or birds, these must be destroyed by spirits of turpentine. When a set of animals or birds are thoroughly dry, they should be packed in a box or case, which has been well joined.

A journal ought to be kept detailing all circumstances connected with the animals, the places in which they were killed, and the color of their eyes, together with any information that can be procured of their habits from the natives. People are too apt to forget particulars when engaged in such varied pursuits, and the sooner they are committed to paper the better.

Should the traveler, accidentally, or in pursuit of natural objects, find himself possessed of the carcass of any large and fine animals, he would deeply regret not being able to fetch away the skin from want of a knowledge how to separate it from the body. We shall, therefore, suppose that he has killed an animal the size of a bull. He must first make an incision under the belly, in the form of a double cross. The central line must reach from the chin to the anus; the two other transverse cuts must reach from one foot to the other. These are always made inside, so that the seams may be less conspicuous when the animal is mounted. The nails or hoofs must be left attached to the skin; the hoofs may be severed from the bone by laying on a stone and striking with a mallet or a hatchet. After this is accomplished the skin is removed from the feet, legs, and thighs, and treated in other respects as pointed out in skinning the elephant, at page 19. The bones of the head must be preserved if possible, leaving it attached at the muzzle only. All the muscles must be removed from the head, and the bones rendered as clean as possible.

As it is probable that an animal of this magnitude has been killed at a great distance from any habitation, there will not be an opportunity of macerating the hide in alum and water, as pointed out for the elephant. The skin will also be too thick for the arsenical soap to penetrate with effect. Under these circumstances, the next best thing to preserve it, is to take the ashes of a wood fire, and rub it well inside. The

skin should then be stretched along the boughs of a tree, and allowed to dry. The skull, after it has also been dried, must be returned into the skin, and the lips, ears, and feet, imbued plentifully with turpentine, which operation must be several times repeated at intervals. Nothing is more effectual in preventing the attacks of insects than this spirit, and no larvæ will exist in places which it has touched.

The skin will be sufficiently dried within two or three days, so that the hair may be turned inward. If some common salt can be procured, a solution of it should be made, and the hair rubbed with it. Both sides of the skin must be rubbed with this two or three times, at intervals of a day.

When sufficiently dry, the skin may be rolled up and packed. The hair ought to be inward, with a layer of dried grass intervening, to prevent friction during conveyance. The operation of rolling up the skin must be begun at the head.

If the journey is long, the skin should be unrolled, and placed in the sun for a few hours, and the places liable to the attack of moths should be again rubbed with turpentine.

When a skin thus prepared has reached the place where it is to be put up, it must undergo a preparation previous to its being mounted. In the first place, it must be extended along the ground with the hair undermost, so that it may acquire fresh pliability, and those parts which remain stiff must be moistened with tepid water. The skin must then be placed in a large vessel of water saturated with alum, there to remain eight or ten days; after which, it must be extended on half-rounded pieces of wood, and thinned with a sharp knife, which is facilitated by the projections of the wood, enabling the operator the more easily to cut it, while it is gradually shifted, till the whole has been pretty equally thinned. When this operation is completed, it is allowed to soak in water with an equal quantity of that saturated with the alum. Twenty-four hours will be sufficient. It must then be placed on the artificial body, as directed for the elephant.

In hunting for snakes, great caution must be exercised, as it is well known that the bite of some of these proves fatal within a quarter of an hour, particularly that of the rattle-snake and some others. Indeed, it would be more prudent to allow the natives to hunt for these poisonous reptiles, as they are better acquainted with their haunts, and the means of defense to be employed in this dangerous pursuit. They are also better acquainted with those which are poisonous. We may, however, remark, that the poisonous snakes have, in general, much larger heads than those which are harmless, and their necks are also narrow. But it would be well for the novice to inform himself in advance as to the noxious animals he is likely to meet.

Different species of sea weed are frequently covered by minute shells ; weeds should always be carefully examined.

Fig. 76.—*Sieve.*

Many of the smaller and microscopic shells are found at high water mark among the fine dross and drifted fragments of shells ; this sand should be brought home and examined at leisure. To facilitate the process, a small wire-cloth sieve should be made, of about six or seven inches, as represented in fig. 76, and all the sand sifted through it, and the shells left.

INSECTS.

This class is subject to infinite variety, according to climate and soil. The entomologist, or the mere collector, must not confine himself to those whose beauty of coloring renders them attractive, but collect all that come in the way. Those species which have wings, and fly around plants, we take by means of gauze nets, as also those which swim in the water. For the construction of these different nets, see previous descriptions. Those which live on putrid substances, and such as are disagreeable to the touch, are seized with pincers ; they are first put into camphorated spirits to render them clean. Trees are the habitation of innumerable insects, many of them skulk under the old rotten bark, and others attach themselves to the foliage. A cloth should be spread under the trees, or an umbrella, and the branches shaken with considerable force, when they will fall down, and may then be caught.

Insects may by killed by making a crow-quill into a point, and dipping it into prussic acid, an incision with it may be made immediately below the head of the insect between the shoulders, which usually produces instant death. But this acid must be used with much caution, because its effects are almost as instantaneous and fatal in the human subject as in the lower animals. When cork cannot be had for lining the bottoms of the boxes, a layer of bee's-wax may be used in its stead. The pin should be deeply sunk in this substance, as it is more liable to loosen than when in cork.

It is of much importance to procure the caterpillar as well as the insect, and, in this case, some of the leaves on which it feeds should be placed in a box beside it, so that it may reach maturity. A small perforation should be made in the box for the admission of air.

Every kind of insect, except butterflies, sphinxes, and moths, may be preserved in bottles of spirits, which will not injure them ; when they are taken out they are immediately placed in the position in which it is wished to preserve them, and they are then allowed to dry. Another mode of preserving coleopterous insects, such as beetles, &c., is to put them

in a dry box among fine sand. A row of insects is placed in a layer of sand, and then a new layer of an inch in depth laid on the top, and so on till the box is filled. This mode of packing will not, however, do with soft insects, and those having fine wings.

It is extremely desirable that all the different kinds of spiders should be caught, particularly those which are said to be venomous; also termites, or white ants, the different *Scolopendra* and gally worms, &c. The nests of spiders and other insects should also be sent home ; in short, every insect which is remarkable, in any way, either for its history or properties.

It is also of much importance to bring specimens of the plants on which they feed ; these should be dried, and their localities marked, the kind of soil on which they grow, and the situations, whether moist or dry, should be noted.

Woods, Hedges, and Lanes.—By far the greatest portion of insects are found in these situations. In woods, the entomologist must beat the branches of the trees into his folding net, and must select for this purpose the open paths, skirts, &c. The trunks of trees, gates, and timber which is cut down, should be carefully examined, as a great many lepidopterous and coleopterous insects are found in these situations, and in no other. In hedges and lanes, many of the most valuable and beautiful insects are found, as also in nettles and other plants which grow under them ; these should be well beaten, but more especially when the white-thorn blossoms in the months of May and June. Hedges where the roads are dusty are very seldom productive.

Heaths and Commons.—Many insects are peculiar to these situations from the plants which grow on them, as well as from the dung of cattle by which many of them are frequented, in the latter of which, many thousands of insects may be found in a single day, in the months of April and May. These are principally of the order *Coleoptera.*

Sand Pits. — These are favorable for the propagation of *Capris lunarius*, *Notoxus monoceros*, *Lixus sulcirostris* and other rare insects. Minute species are found abundantly at the roots of grass.

Meadows, Marshes, and Ponds. — In meadows, when the Ranunculi, or butter-cups, are in blossom, many *Muscæ* and dipterous insects generally abound. The flag-rushes are the habitations of *Cassida*, *Donacina*, and others. Drills in marshes should be examined, as many species of insects are found on long grass. The larvæ of various *Lepidoptera*, and *Neuroptera* are confined to these situations, more especially if hedges and trees are near the spot. Ponds are rich in microscopic insects. These are obtained by means of the landing net, which, for this purpose, need not be so long as represented in fig. 60, page 81, and should be made of pretty thick cotton cloth, but sufficiently thin to allow the water to escape. The

mud which is brought up from the bottom of ponds and ditches should be examined, and what small insects are found may be put in a small phial filled with water, which will not only clean them, but keep them alive; and in many instances the naturalist will be surprised upon the examination of these, the most wonderful productions of nature.

Moss, Decayed Trees, Roots of Grass, &c.—Many insects will be found in moss and under it; the roots and wood of decayed trees afford nourishment and a habitation to a number of insects; many of the larvæ of *Lepidoptera* penetrate the trunks of trees in all directions; most of the *Cerambyces* feed on wood, as well as some species of *Carabidæ*, *Elateridæ*, &c. In seeking for these, it is necessary to use the digger, shown in fig. 62, page 81. It is sometimes requisite to dig six or seven inches into the wood before they are found.

Banks of Ponds and Roots of Grass.—These are a never-failing source of collecting, which may be followed at all seasons of the year, and in general with great success; those banks are to be preferred which have the morning or noon-day sun.

Banks of Rivers, Sandy Sea Shore, &c.—These situations afford a great variety of *Coleoptera*, *Crustacea*, &c. The dead carcasses of animals thrown on the shore should be examined, as they are the receptacles and food of *Silphiodæ*, *Staphilinidæ*, &c. May and June are the best seasons for collecting these insects.

Dead Animals, and Dried Bones, should be constantly examined, for these are the natural habitats of several insects. It is not uncommon for country people to hang dead moles on bushes; under these the entomologist should place his net, and shake the boughs on which they are hung, as many of the *Coleoptera* generally inhabit these.

Fungi and Flowers.—These are the constant abode of insects, and many curious species will be found on them.

It is a mistaken idea that insects are only to be found in summer, as they are to be met with, either in a living or pupa state, at all seasons. Dried moss, beneath the bark of trees, and under stones, are extremely likely places to find insects in winter; and even then, the entomologist is more likely to procure some of the rare species, than in summer, as these are ranging in search of food, and in situations hidden from view.

At this season, if the weather is mild, the pupæ of *Lepidoptera* will be found at the roots of trees, more especially those of the elm, oak, lime, &c., or beneath the underwood, close to the trees, and these frequently at the depth of some inches under the ground.

In the months of June, July, and August, the woods are the best places to search for insects. Most of the butterflies are taken in those months, flying about in the day-time only. Moths are either found at break of day, or at twilight in the

evening. The following method of taking moths is pointed out by Haworth, in speaking of the oak-moth, *Bombyx Quercus*: "It is a frequent practice with the London Aurelians," says he, "when they breed a female, of this and some other day-flying species, to take her, while yet a virgin, into the vicinity of woods, where, if the weather is favorable, she never fails to attract a numerous train of males, whose only business seems to be an incessant, rapid, and undulating flight, in search of their unimpregnated female; one of which is no sooner preceived, than they become so much enamored of their fair and chaste relation, as absolutely to lose all kind of fear for their own personal safety, which, at other times, is effectually secured by the reiterated evolutions of their strong and rapid wings. So fearless, indeed, have I beheld them on these occasions, as to climb up and down the sides of a cage which contained the dear object of their eager pursuit, in exactly the same hurrying manner as honey-bees, which have lost themselves, climb up and down the glasses of a window."

PART NINTH.

Recipes for the Various Articles used in the Preservation and Setting up of Animals, &c.

SOLUTION OF CORROSIVE SUBLIMATE.

PUT a large tea-spoonful of well-pounded corrosive sublimate into a wine-bottleful of alcohol (spirits-of-wine.) Let it stand over night, and the next morning, draw it off into a clean bottle. When the solution is applied to black substances, and little white particles are perceived on them, it will be necessary to make it weaker, by the addition of some alcohol. A black feather, dipped into the solution, and then dried, will be a very good test of the state of the solution; if it be too strong, it will leave a whiteness upon the feather.

ARSENICAL SOAP.

Invented by Becœur, Apothecary, Metz.

Arsenic, in powder, - -	2 pounds,
Camphor - - - -	5 ounces,
White Soap, - . -	2 pounds,
Salt of Tartar, - - -	12 ounces,
Powdered Lime, - - -	4 ounces.

The soap must be cut in small and very thin slices, put into

a crucible with a small quantity of water, and held over a gentle fire, and frequently stirred with a wooden spatula, or a piece of wood of any kind. When it is properly melted, the powdered lime and salt-of-tartar must then be added, and thoroughly mixed. It must now be taken off the fire, the arsenic added gently, and stirred. The camphor must be reduced into a powder, by beating it in a mortar, with the addition of a little spirits-of-wine. The camphor must then be added, and the composition well mixed with a spatula, while off the fire. It may be again placed on the fire, to assist in making the ingredients incorporate properly, but not much heated, as the camphor will very rapidly escape. It may now be poured into glazed earthen pots, and allowed to cool, after which a piece of paper should be placed over the top, and afterward some sheep leather, and then set aside for use. The composition is about the thickness of ordinary flour paste.

When it is necessary to use the soap, put as much as will answer the purpose into a preserve-pot, and add to it about an equal proportion of water. This is applied to the skin or feathers with a bristle brush.

N. B.—It should be kept as close as possible, and used with caution, as it is a deadly poison.

The above is the recipe made use of at the Jardin des Plantes, Paris.

ARSENICAL COMPOSITION.

Mr. Laurent's Recipe.

A distinguished French naturalist, Laurent, recommends the following composition, after ten years' experience, for preserving the skins of stuffed animals. He observes, at the same time, that it penetrates them with greater readiness, and preserves them much better than any preparation which has hitherto been in use :

Arseniate of Potash, - - -	2 drachms,
Sulphate of Alumine, - - -	2 do.
Powdered Camphor, - - -	2 do.
White Soap, powdered, - - -	½ oz.
Spirits of Wine, - - - -	6 oz.
Essence of Thyme, - - -	3 drops.

The arseniate of potash, sulphate of alumine, and soap, are to be placed in a phial, with a large mouth, and the spirits of wine to be poured on them, at a heat of twenty-five degrees, and they will be perfectly combined in twenty-four hours. The essence of thyme is then added, when the phial must be carefully corked. This composition is to be shaken together before it is made use of, and it must be spread over the skin of the animal or bird with a brush.

SOLUTION OF PEARL-ASHES.

Two ounces of pearl-ash to one gallon of water.

ANNEALED IRON WIRE.

Take common iron wire, make it red hot, and suffer it to cool gradually ; this renders it soft and pliable, so that it may be easily bent in any direction.

CEMENT.

Fine Whitening, - - - -	2 oz.
Gum-Arabic, - - . -	2 oz.
Finest Flour, - - . -	¼ oz.
Ox-Gall, a tea-spoonful.	

The whole to be dissolved, and mixed well with water into a thick paste.

This is well adapted for attaching different object, and especially for fixing shells to pasteboard, &c.

GUM PASTE.

White Sugar Candy, - - -	2 oz.
Common Gum-Arabic, - - -	4 oz.

Let these be melted in a pot of hot water, and then strained through a linen or horse-hair sieve. When properly dissolved, add to it two table-spoonfuls of starch, or hair-powder, and mix the whole well together. This paste may be used for many purposes, and it never spoils. It may be dried, and by pouring a little warm water on it, it will soon be ready for use. If it is wished to be all melted, and hurriedly, the pot containing it should be placed in warm water, or heated sand.

FLOUR PASTE.

Make flour paste in the ordinary way, and add to it a small portion of the solution of corrosive sublimate, or powdered corrosive sublimate. This will prevent the attack of mites, to which paste is very liable when dried. This paste may be dried into a cake, and moistened when required.

SOLUTION OF GUM-ARABIC.

The solution of gum arabic is made by simply adding water to it. When used as a varnish, or for attaching objects, it is extremely apt to get too brittle, in very warm weather, and to crack, or split off in scales ; to prevent this, a quarter of an ounce of white or brown sugar candy must be added to two ounces of gum arabic.

PAPER PASTE, GUMMED.

Take a coffee-pot, filled with water, and add to it a quantity

of paper, which has been slightly sized, like that used for printing engravings. Let it boil for three hours, and when the water has evaporated, boil it again for a similar length of time. Take out the paper, and squeeze it well in a colander, and then pound it in a mortar, until it is reduced to a very fine paste. It must then be dried. When it is required for use, add to it some of the solution of gum-arabic; and keep it in a pot for use.

POLLEN POWDER.

The paper made as above directed, when well dried, is pounded in a mortar till it becomes a very fine powder, it is then put into a tin pepper-box, and when any of the parts of parrots' bills, &c., are wished to have this powdered appearance, a little of the solution of gum-arabic is washed over the part with a camel-hair pencil, and the powder dusted on it, and allowed to dry.

RED VARNISH.

Take a stick of red sealing-wax beat it down with a hammer, and then put it into a phial, with an ounce of strong spirits-of-wine, which will dissolve it within four or five hours. It may be applied to any part with a camel-hair pencil, and it will dry in less than five minutes.

Black, yellow, and green, or indeed any color of varnish, may be made from sealing-wax of these various colors.

To those unacquainted with the combination of colors, we may mention, that a mixture of blue and yellow produces green; pink and blue makes purple; red and yellow, orange; black, red, and yellow, brown; black and blue, gray. These may be varied, in an infinity of shades, by either color predominating, and by the addition of other colors.

Varnishes of gum-copal and gum-mastic, and white spirit varnish, are also used for different preparations, but as these can be easily purchased at a cheap, or even a cheaper rate than they can be made in small quantities, we think it unnecessary to give recipes for making them.

LUTING FOR RENDERING BOTTLES AIR-TIGHT.

Common Resin,
Red Ocher reduced to a fine powder.
Yellow Wax.
Oil of Turpentine.

These must be melted over a fire in the following manner; and the vessel in which it is made should be capable of holding three times the quantity required, to allow ample room for boiling up. An earthenware pipkin with a handle is the best thing for the purpose, and a lid must be made of tin to fit it. The luting will be rendered more or less brittle, or elastic, as the red ocher prevails.

The wax is first melted, and then the resin ; the ocher is then added in small quantities, and stirred quickly with a spatula each time. When all the ocher has been added, it must be allowed to boil six or eight minutes ; the turpentine is then added, and briskly stirred with the spatula, and continue to boil it. There is considerable risk of the mixture taking fire, and should it do so, the lid must immediately be put on the vessel to extinguish it.

To ascertain the consistence of the luting, a little must be, from time to time, dropped on a cool plate, or flat piece of iron. If it is too soft, more of the ocher must be added to it ; and if too hard, additional wax and turpentine.

TOW AND FLAX SLIVERS.

These are fillets of prepared tow and flax, of from one to three inches in breadth. They are extremely uniform in their thickness, being made to weight, and can easily be procured from any flax-spinning mill, at a moderate price per pound weight.

CARBOLIC ACID.

We have, in a previous portion of this work, spoken of the use of carbolic acid as a preservative. It is very useful in quickly and neatly helping to preserve fishes, when it is not desired to skin them. In such case the intestines are withdrawn by an incision in the abdomen, and a solution of the acid poured in. In regard to insects, if it is desired to preserve them only, without reference to their natural colors, the acid will answer very well, but if it is wished to retain the bright markings which characterize many insects, no carbolic acid must be used, as it in almost all cases darkens with age and discolors the specimens ; of course this objection will not hold good in the case of dark and hard-bodied insects, in which instances a solution of carbolic acid can be used with much advantage. Another thing must be remembered—the *pure* acid is never to be used, it being perfectly useless. It must be very much diluted; the following being good proportions :

Carbolic Acid, - - -	1 desert-spoonful,
Boiling Water - - -	2 quarts.

The crystalized acid must first be melted, and then added to the hot water.

SHIELD'S "SUGAR" FOR MOTHS.

For the capture of moths the most successful time is in the evening, or even toward midnight. When seeking them in the dark, the collector proceeds to their known habitat with

a lantern, round which the moths soon gather. Should the fruit-bearing trees not be in full blossom, recourse may be had to "sugaring," or brushing a sweet compound, known by the technical name of "sugar," over the trunks of trees and on stones and posts, to attract the moths. The following is the recipe for making :

Ale - - - - -	½ pint, (nearly)
Common Honey - - -	½ pound,
Sugar - - -	¼ pound,
Rum - - -	½ wine-glass,
Oil Bitter Almonds - -	5 drops.

The ale is heated, and then the sugar and honey added ; when cold the rum and oil of almonds, mixed together, are added.

ANOTHER "SUGAR."

A thick syrup, made of brown sugar, with a small quantity of rum.

NICOLAS' GUM PASTE.

Colocynth - - - - -	1 oz.
Gum Arabic, in powder - -	2 oz.
Starch - - - - - -	3 oz.
Cotton, finely cut - - - -	½ oz.

The colocynth is cut into small fragments, and boiled in about a pint of water ; the liquor is then strained, and the starch and gum added to it. The mixture is allowed to simmer on a slow fire for a short time. The cotton, being previously as finely reduced as possible by clipping with scissors, is added, and the whole well mixed. A few drops of the corrosive sublimate solution will make an improvement. The cement may be softened by placing it in boiling water.

FINIS

PRICE LIST OF ARTIFICIAL EYES.

In response to numerous inquiries for information, we give a list of prices at which Artificial Eyes are sold, together with illustrations which show the actual size of each style:

ENAMELED EYES.		BLACK EYES.	
No. 1, per 100 pair	$4 00	No. 1, per 100 pair	$ 30
2, " "	4 50	2, " "	35
3, " "	5 00	3, " "	40
4, " "	5 50	4, " "	50
5, " "	6 00	5, " "	60
6, " "	7 00	6, " "	80
7, " "	8 00	7, " "	1 00
8, " "	9 00	8, " "	1 20
9, " "	10 00	9, " "	1 40
10, " "	11 50	10, " "	1 60
11, per 50 pair	6 50	11, per 50 pair	1 00
12, " "	7 25	12, " "	1 20
13, " "	8 00	13, " "	1 40
14, " "	9 00	14, " "	1 75
15, " "	10 50	15, " "	2 10
16, per 25 pair	6 00	16, per 25 pair	1 25
17, " "	6 75	17, " "	1 50
18, " "	7 50	18, " "	2 00
19, " "	8 25	19, " "	2 50
20, " "	9 00	20, " "	3 00
21, per 10 pair	4 00	21, per 10 pair	1 40
22, " "	4 80	22, " "	1 60
23, " "	5 60	23, " "	1 90
24, " "	6 40	24, " "	2 20
25, " "	7 20	25, " "	2 50
26, " "	8 00	26, " "	3 00
27, " "	12 00	0, per 100 pair	25
28, " "	16 00	00, " "	20

Eyes with white corners, measure long diameter.

Cat, Tiger, Albino and White Rabbit Eyes are double price.

Black Eyes are the size of Enameled or lithographed measure (full size).

No. 0 is smaller than No. 1 Black Eyes.

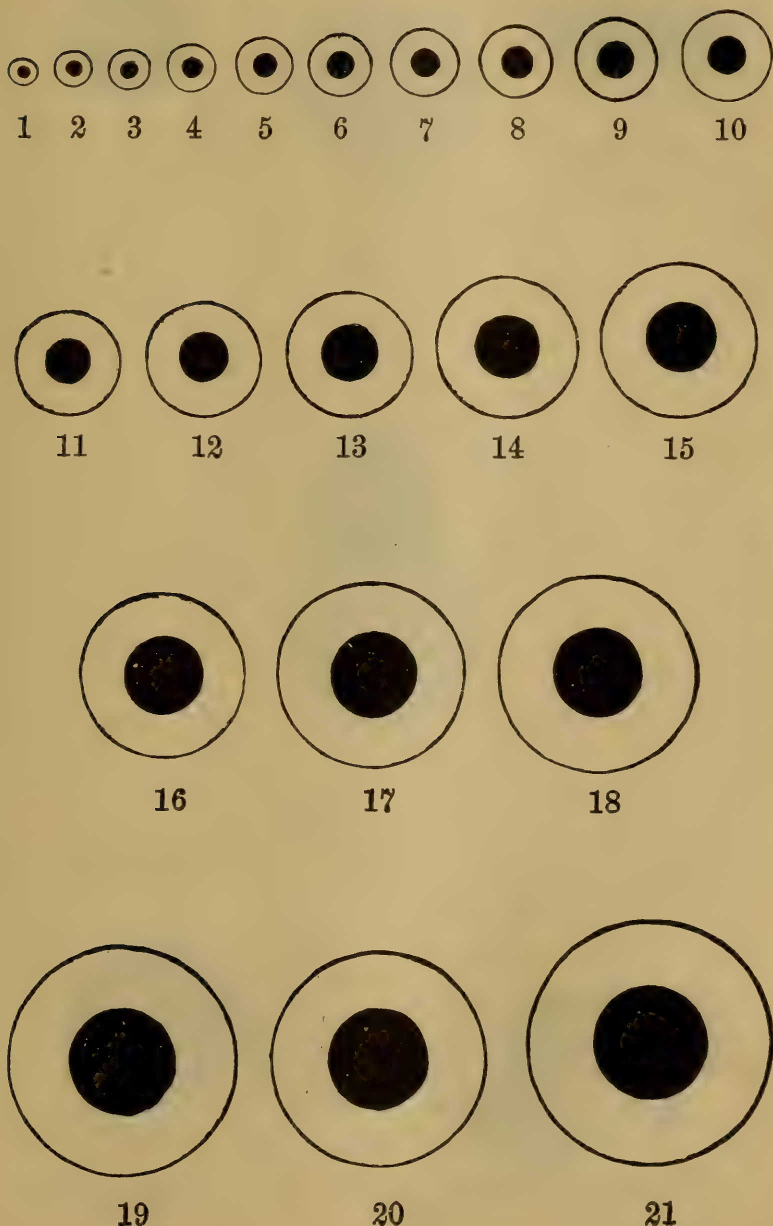
No. 00 is smaller than No. 0 Black Eyes.

Insect Pins, per 100, assorted, 18 cents nett.

" " " 25 "

Artificial Leaves, per gross, 25 to 50 cents.

SIZES OF ARTIFICIAL EYES.



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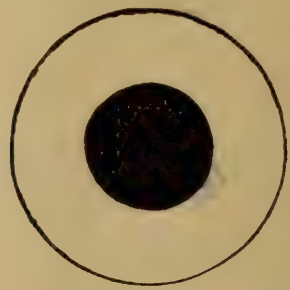

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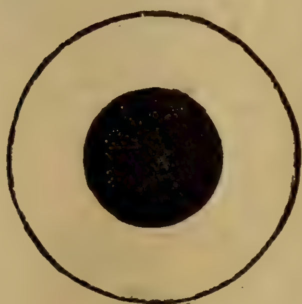

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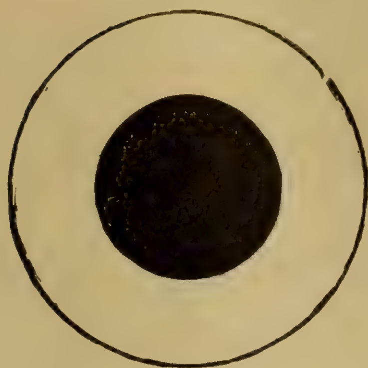

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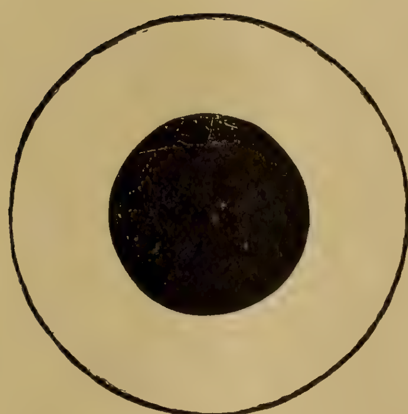

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PRACTICAL RECEIPTS

AND PROCESSES FOR EVERY-DAY USE.

PATENT MEDICINES, AND HOW TO MAKE THEM.

As every one is aware, the manufacture of "Patent Medicines" is one of the most profitable occupations a person can engage in. Such being the fact, we think the directions for making some of the best articles of the kind, which we append, are worthy of the first place in our book. Some general directions to the amateur manufacturer may not be out of place. The ingredients should all be of the best quality, and should be free from dirt and all impurities ; in preparing the remedies, cleanliness should be observed in all the details, the vessels used should be carefully cleansed before and after using, and the bottles, &c., which are used to put the medicines in, should be free from dust or dirt; as the appearance of the articles depends much on these points. In regard to putting up for sale, the best guides are the various compounds of the kind in market, though the style may be varied to suit the manufacturer. In all cases neat and attractive labels and wrappers should be used, and care should be taken that they do not get soiled, as people seldom purchase an article with a dirty or shabby appearance. It is usual to have a label pasted on the bottle, and the directions for use, &c., printed on a paper,

and wrapped around the bottle, the whole being done up in a colored wrapper, a piece of pasteboard being placed over the cork to give the wrapper a square appearance.

SALVES are put up in *tin* boxes, with a wrapper around the box, and directions.

PILLS are put up in oblong boxes, made of thin wood, with a paper wrapper. The twenty-five cent boxes usually contain from twenty-five to thirty pills, though in some cases not so many are given. The following receipts embrace the *best* and most widely manufactured articles of the various kinds. It is important that the quantity and ingredients should be adhered to. In some cases (as in simple salves and other like articles) this does not matter, but in all the powerful remedies, and and where the *relative* value of the ingredients effect the cure, any departure from the receipt would render the article worthless, if not absolutely injurious. The quantities may, however, be increased or diminished, if the *proportions* remain the same.

In conclusion, let me say, that success in this, as in all other occupations, depends upon industry and good management; and while a valuable article seldom fails to succeed, a worthless one, although apparently successful at the start, generally proves a profitless undertaking in a short time, and irreparably injures the character of the manufacturer.

Let "Honesty is the best policy" be your motto, and by perseverance and industry you may count success as sure.

Anti-Bilious Pills.—Compound extract of colocynth, 60 grains; rhubarb, 30 grains; soap, 10 grains. Make into 24 pills. Dose, 2 to 4.

2. Compound extract of colocynth, 2 drachms; extract of rhubarb, ½ drachm; soap, 10 grains. Mix, and divide into 40 pills. Dose, 1, 2, or 3.

3. Scammony, 10 to 15 grains; compound extract of colocynth, 2 scruples; extract of rhubarb, ½ drachm; soap, 10 grains; oil of carroway, 5 drops. Make into 20 pills. Dose, 1 or 2, as required.

Purgative Pills.—Simple extract of colocynth, 24 grains; extract of jalap, 12 grains; blue pill, 12 grains; ipecacuanha, 4 grains ; oil of peppermint, 3 drops. Make into 12 pills. Dose, 2 to 4.

Dinner Pills.—Aloes, 20 grains ; ginger, ½ drachm ; add syrup sufficient to mix. Divide into 20 pills. One to be taken daily, before dinner.

Itch Ointment.—Olive oil, 1 lb. ; suet, 1 lb. ; alkanet root, 2 ounces. Melt, and when sufficiently colored, strain and add 3 ounces each of alum, nitre, and sulphate of zinc, in fine powder.

2. Carbonate of potash, ½ ounce ; rose-water, 1 ounce; vermilion, 1 drachm; sulphur, 11 ounces; oil of bergamot, ½ drachm; lard, 11 ounces. Mix.

Camphorated Eye-Water.—Sulphate of copper, 15 grains ; French bole, 15 grains ; camphor, 4 grains ; boiling water, 4 ounces. Infuse, strain, and dilute with 2 quarts of cold water.

Digestive Pills.—Rhubarb, 2 ounces ; ipecacuanha, ½ ounce; cayenne pepper, ¼ ounce; soap, ½ ounce ; ginger, ¼ ounce; gamboge, ½ ounce. Mix, and divide into 4-grain pills.

Camphor Liniment.—Rectified spirits, 17 fluid ounces; strong water of ammonia, 2½ ounces; camphor, 2 ounces, oil of lavender, 5 drops.

Cephalic Snuff.—Dried asarbacca leaves, 3 parts ; marjoram 1 part, lavender flowers, 1 part; rub together to a powder.

Chamomile Drops.—This nostrum is merely spirits, flavored with oil of chamomile. A strong tincture of the flowers is much better.

Chamomile Pills.—Aloes, 12 grains; extract chamomile, 36 grains ; oil of chamomile, 3 drops ; make into 12 pills; 2 every night, or twice a day.

For Chronic Rheumatism.—Powdered rhubarb, 2 drachms ; cream of tartar, 1 ounce ; guaiacum 1 drachm ; sulphur, 2 ounces ; 1 nutmeg, grated fine ; clarified honey, 16 ounces. Mix, take 2 spoonfuls night and morning.

Cholera Remedy.—Spirits of wine, 1 ounce ; spirits of

lavender, ¼ ounce; spirits of camphor, ¼ ounce; compound tincture of benzoin, ½ ounce; oil of origanum, ¼ ounce; twenty drops on moist sugar. To be rubbed outwardly also.

2. Twenty-five *minims* of diluted sulphuric acid in an ounce of water.

Corn Remedy.—Soak a piece of copper in strong vinegar for 12 or 24 hours. Pour the liquid off, and bottle. Apply frequently, till the corn is removed.

2. Supercarbonate of soda, 1 ounce, finely pulverized, and mixed with ½ ounce lard. Apply on linen rag every night.

Preventive of Sea-sickness.—Boil 2 ounces of opium, 2 drachms extract of henbane, 10 grains of mace, and 2 ounces of soap, in 3 pints of water, for half an hour. When cold, add 1 quart of rectified spirits, and 3 drachms of spirits of ammonia. To be used as an embrocation.

Edinburgh Ointment.—White hellebore powder, sal ammoniac, and lard.

Extract of Sarsaparilla.—Jamaica sarsaparilla, 16 ounces; lukewarm water (100° to 112° F.) sufficient to cover it. Macerate six hours, and strain. Add to the water the following ingredients, and boil: bruised licorice root, sassafras, guaiacum raspings, of each 2 ounces; mezercum, ¾ ounce. Let it cool, stirring occasionally, and add 2 ounces of rectified spirits of wine, in which a few drops of oil of sassafras have been dissolved. Good for humors, &c. Sells for one dollar per quart.

Godfrey's Cordial.—Sassafras, 6 ounces; seeds of carriander, carraway, and anise, of each 1 ounce; infuse in 6 pints of water; simmer the mixture till reduced to 4 pints, then add six pounds of molasses; boil a few minutes; when cold, add 3 fluid ounces of tincture of opium. For children teething.

Hooper's Female Pills.—Sulphate of iron, 8 ounces; water, 8 ounces; dissolve, and add Barbadoes aloes, 40 ounces; myrrh, 2 ounces; make 1000 pills. Dose, 2 to 6.

Whooping Cough.—Supercarbonate of potash, 20 grains; powdered cochineal, 10 grains; hot water, ¼ of a pint.

Mix, strain, and sweeten with white sugar. Dose, a teaspoonful to a tablespoonful, according to age.

Corn Plaster.—Yellow wax, 1 pound; Venice turpentine, 2 ounces; verdigris, 1 ounce; melt together and spread on leather.

Cough Lozenges.—Powdered lactucarium, 2 drachms; extract of licorice root, 12 drachms; powdered squills, 15 grains; refined sugar, 6 ounces; mucilage of tragacanth sufficient to mix. Make into 240 equal lozenges.

Cough Mixture.—4 drachms paregoric, with 2 drachms of sulphuric ether, and 2 drachms tincture of tolu. Dose, a teaspoonful in warm water.

To prevent Hydrophobia.—Elecampane, 1 drachm; chalk, 4 drachms; Armenian bole, 3 drachms; alum, 10 grains ; oil of anise-seed, 5 drops.

Pile Ointment.—Powdered nutgall, 2 drachms ; camphor, 1 drachm ; melted wax, 1 ounce ; tincture of opium, 2 drachms. Mix.

Cancer Ointment.—White arsenic, sulphur, powdered flowers of lesser spearwort, and stinking chamomile, levigated together, and formed into a paste with white of egg.

Rouche's Embrocation.—Olive oil, with half its weight of oil of cloves and oil of amber.

Riga Balsam, for Bruises.—Mix 4 ounces of spirits of wine with 1 drachm of compound tincture of benzoin and 2 drachms of tincture of saffron.

Golden Ointment.—Orpiment, mixed with lard to the consistence of an ointment.

Swaim's Vermifuge.—Wormseed, 2 ounces ; valerian, rhubarb, pink-root, white agaric, of each 1½ ounce ; boil in sufficient water to yield 3 quarts of decoction, and add to it 30 drops of oil of tansy, and 45 drops of oil of cloves, dissolved in a quart of rectified spirits. Dose, 1 tablespoonful at night.

Tincture for Wounds.—Digest flowers of St. Johnswort, 1 handful, in ½ pint of rectified spirits, then express the liquor, and dissolve in it myrrh, aloes, and dragon's-blood, of each 1 drachm, with Canada balsam, ½ ounce.

Essence for the Headache.—Spirits of wine, 2 pounds; roche alum, in fine powder, 2 ounces; camphor, 4 ounces; essence of lemon, ½ ounce; strong water of ammonia, 4 ounces. Stop the bottle close, and shake it daily for three or four days.

Foot Ointment (for all domestic animals).—Equal parts of tar, lard, and resin, melted together.

Liniment for Sore Throats.—Oil of turpentine, 1 ounce; sweet oil, 1 ounce; water of ammonia, 2 ounces.

Spirits of Camphor.—Camphor is dissolved without limit in alcohol. A good proportion for family use is an ounce of camphor to a pint of alcohol A few drops of alcohol in a mortar are necessary to enable us to powder camphor, when the powder is required for pills or ointments.

Simple Cerate.—Take of white wax, one pound; lard, 4 pounds; melt with a gentle heat, and stir till cool. A simple healing salve.

Cascarilla Tonic.—Take of cascarilla, bruised, 1 ounce; boiling water, 1 pint; digest (without boiling) on a warm stove two hours. Dose, a wineglassful every three, four, or six hours.

Basilicon Ointment.—Good resin, 5 parts; lard, 8 parts; yellow wax, 2 parts. Melt, and stir together till cool.

Spice Plaster.—Take of powdered cloves, 1 ounce; ground cinnamon, 1 ounce; ground allspice, 1 ounce; ground black pepper, 2 ounces; flour, 3 or 4 ounces, or enough to mix. Mix in a paste with vinegar, and spread upon muslin. This is a stimulating plaster; if a more powerful one is required, substitute cayenne for black pepper.

Volatile Liniment.—Take of spirits of hartshorn (aqua ammoniac), 1 part; sweet oil, 4 to 6 parts. The weaker preparation is the more elegant; but the stronger may be used when a powerful stimulating liniment is required.

Russia Salve.—Take equal parts of yellow wax and sweet oil, melt slowly, carefully stirring; when cooling, stir in a small quantity of glycerine. Good for all kinds of wounds, &c.

Pain Killer.—Put 5 tablespoonfuls of cayenne in a wide-mouth bottle, add half a pint of alcohol and a small piece of camphor. Cork and let it stand 10 or 12 days or longer, then pour carefully into bottles. This is an excellent internal and external remedy.

Soothing Syrup.—Take one pound of honey, add 2 tablespoonfuls of paregoric, and the same of oil of anise-seed, add enough water to make a thick syrup, and bottle. For children teething, dose, a teaspoonful occasionally.

Arnica Liniment.—Add to one pint of sweet oil, 2 tablespoonfuls of tincture of arnica ; or the leaves may be heated in the oil over a slow fire. Good for wounds, stiff joints, rheumatism, and all injuries.

Blackberry Cordial for Diarrhœa.—To half a bushel of blackberries, well mashed, add a quarter of a pound of allspice, 2 ounces of cinnamon, 2 ounces of cloves ; pulverize well, mix and boil slowly until properly done ; then strain or squeeze the juice through home-spun or flannel, and add to each pint of the juice 1 pound of loaf sugar, boil again for some time, take it off, and, while cooling, add half a gallon of the best Cognac brandy.

A Cure for Diarrhœa.—The following is said to be an excellent cure for the above distressing complaint : Laudanum, 2 ounces ; spirits of camphor, 2 ounces ; essence of peppermint, 2 ounces ; Hoffman's anodyne, 2 ounces ; tincture of cayenne pepper, 2 drachms ; tincture of ginger, 1 ounce. Mix all together. Dose : a teaspoonful in a little water, or a half teaspoonful repeated in an hour afterward in a tablespoonful of brandy. This preparation, it is said, will check diarrhœa in ten minutes, and abate other premonitory symptoms of cholera immediately. In cases of cholera, it has been used with great success to restore reaction by outward application.

Invalid Cordial.—An excellent article to strengthen and restore the tone of the stomach. It prevents faintness or a sinking feeling at the stomach, and for persons subject to low and depressed spirits, it affords great relief. It is made thus :

Dissolve gum arabic, 2 ounces, in 1 pint of rain water,

and $1\frac{1}{2}$ wine glass of best brandy, take a tablespoonful three or four times a day.

Cramp Remedy.—Ten drops of the oil of lavender, taken in a gill of French brandy, and repeated hourly if necessary.

Cough Compound.—For the cure of coughs, colds, asthma, whooping cough, and all diseases of the lungs: One spoonful of common tar, 3 spoonfuls of honey, the yolk of 3 hen's eggs, and $\frac{1}{2}$ pint of wine; beat the tar, eggs, and honey well together with a knife, and bottle for use. A teaspoonful every morning, noon, and night, before eating.

Opodeldoc.—Take 2 ounces of Venetian soap; 1 ounce gum camphor; 1 pint of brandy; dissolve the soap in the brandy by a slow heat, then add the camphor.

Hot Drops.—This is made by adding $\frac{3}{4}$ of a pound of best gum myrrh, pulverized, and 1 ounce of African cayenne, to 1 gallon of alcohol, or fourth-proof brandy.

Composition—Take 1 pound of fine bayberry bark, 8 ounces of ginger, 3 ounces of cayenne, and mix well together.

Ointment for Scruf in the Heads of Infants.—Lard, 2 ounces; sulphuric acid, diluted, 2 drachms; rub them together, and anoint the head once a day.

Infants' Syrup.—The syrup is made thus: 1 pound best box raisins, $\frac{1}{2}$ an ounce of anise-seed, two sticks licorice; split the raisins, pound the anise-seed, and cut the licorice fine; add to it 3 quarts of rain water, and boil down to 2 quarts. Feed three or four times a day, as much as the child will willingly drink. The raisins are to strengthen, the anise is to expel the wind, and the licorice as a physic.

Female Obstructions, &c.—Make a syrup of equal parts of heart's ease, spikenard root with the pith out, Turkey root, wild licorice, pond-lily root, a small part of bloodroot, and a double proportion of an herb called female flowers. The last often grows by the edges of ponds, and has a leaf and blossoms similar to cowslips, but grows single, one root or stalk by itself, and smaller than the cowslip. The blossom is yellow. It is one of

the finest roots for females in the world. Boil in fair water until the substance is extracted; strain, sweeten with honey, add as much rum as will keep it from souring; drink half a gill on going to bed, every night. It will strengthen the system and throw off all obstructions.

Elder Flower Ointment.—Lard, 25 pounds prepared mutton suet, 5 pounds; melt in an earthen vessel; and elder flower water, 3 gallons. Agitate for half an hour, and set it aside; the next day gently pour off the water, remelt the ointment, add benzoic acid, 3 drachms; otto of roses, 20 drops; essence of bergamot and oil of rosemary, of each, 30 drops; again agitate well, let it settle for a few minutes, and then pour off the clear into pots.

Cure for Corns.—Take 2 ounces of gum-ammoniac, 2 ounces of yellow wax, 6 drachms of verdigris; melt them together and spread the composition on soft leather. Cut away as much of the corn as you can, then apply the plaster, and renew it every fortnight till the corn is away.

Uses of Camphor.—*Spirits of Camphor.*—The gum resin camphor readily dissolves in alcohol, forming spirits of camphor. About 2 ounces of the camphor are generally dissolved in about a pint of the spirits. It is used as an external application for sprains, local pains, and stitches. It is applied by rubbing with the hand upon the painful part. To secure the full benefit of the application, the part should be afterwards covered with a piece of flannel of suitable size, more or less wetted with the spirits, and the whole covered with oil silk for the purpose of restraining evaporation.

Camphorated Oil.—This is another camphor liniment. The proportions are the same as in the preceding formula, substituting olive oil for the alcohol, and exposing the materials to a moderate heat. As an external stimulant application it is even more powerful than the spirits; and to obtain its full influence, the part treated should be also covered with flannel and oil silk. It forms a valuable liniment in chronic rheumatism, and other painful affections, and is specially valuable as a counter-irritant in sore or inflamed throats, and diseased

bowels. Camphor constitutes the bases of a large number of valuable liniments. Thus, in cases of whooping-cough and some chronic bronchitic affections, the following liniment may be advantageously rubbed into the chest and along the spine : Spirits of camphor, 2 parts ; laudanum, $\frac{1}{2}$ a part ; spirits of turpentine, 1 part ; castile soap in powder, finely divided, $\frac{1}{2}$ an ounce ; alcohol, 3 parts. Digest the whole together for three days, and strain through linen. This liniment should be gently warmed before using. A powerful liniment for old rheumatic pains, especially when affecting the loins, is the following :—Camphorated oil and spirits of turpentine, of each 2 parts ; water of hartshorn, 1 part ; laudanum, 1 part ; to be well shaken together. Another very efficient liniment or embrocation, serviceable in chronic painful affections, may be conveniently and easily made, as follows : Take of camphor, 1 ounce ; cayenne pepper in powder, 2 teaspoonfuls ; alcohol, 1 pint. The whole to be digested with moderate heat for ten days, and filtered. It is an active rubifacient; and, after a slight friction with it, it produces a grateful thrilling sensation of heat in the pained part, which is rapidly relieved.

Whooping Cough.—Mix a quarter of a pound of ground elecampane root in half a pint of strained honey and half a pint of water. Put them in a glazed earthen pot, and place it in a stone oven, with half the heat required to bake bread. Let it bake until about the consistency of strained honey, and take it out. Administer in doses of a teaspoonful before each meal, to a child ; if an adult double the dose.

Cure for Inflammatory Rheumatism.—Half an ounce of pulverized saltpetre put in half a pint of sweet oil ; bathe the parts affected, and a sound cure will be speedily effected.

For Disease of the Bowels.—Take equal parts of syrup of rhubarb, paregoric, and spirits of camphor ; mix together. For an adult, 1 teaspoonful. If necessary, it may be repeated in two or three hours.

For Cough.—Take 1 tablespoonful of molasses, 2 tea-

spoonfuls of castor oil, 1 teaspoonful of camphor, and 1 teaspoonful of paregoric ; take half a teaspoonful frequently. This is of great service when children have symptoms of croup.

Rheumatic Plaster.—½ pound of resin, and ½ pound of sulphur—melt them by a slow fire, then add one ounce of cayenne pepper, and ½ an ounce of camphor gum ; stir well till mixed, and temper with neats'-foot oil.

Catarrh.—Take dry bloodroot, and reduce it to powder—mix it with gum camphor ; use it as a snuff. It is said to be a certain cure.

Balm-Gilead.—Balm-gilead buds, bottled up in new rum, are very healing to fresh cuts or wounds. No *family* should be without a bottle.

Dysentery.—In diseases of this kind, the Indians use the root and leaves of the blackberry bush—a decoction of which in hot water, well boiled down, is taken in doses of a gill before each meal, and before retiring to bed. It is an almost infallible cure.

Certain Cure for Headache and all Neuralgic Pains.—Opodeldoc, spirits of wine, sal ammoniac, equal parts To be applied as any other lotion.

Ayer's Cherry Pectoral.—Take 4 grains of acetate of morphia, 2 fluid drachms of tincture of bloodroot, 3 fluid drachms each of antimonial wine and wine of ipecacuanha, and three fluid ounces of syrup of wild cherry. Mix.

Rheumatic Oil.—This is made by taking 2 ounces of sweet oil and one of cajeput, and shaking them well together.

For Toothache.—1 pint of pure brandy, 1 ounce of cayenne pepper ; let them stand in a bottle 24 hours, then strain the liquor off, and add one ounce of muriatic acid, and ready for use.

To Cure a Felon.—Take equal parts of gum camphor, gum opium, castile soap, and brown sugar, wet to a consistency of paste, with spirits of turpentine, and apply it.

Worms in Children.—Steep or boil in a pewter vessel, over a moderate fire, very strong, the bark of spotted

alder or witch-hazel. For a year old, a tablespoonful; increase the dose according to age. Give four or five times a day, for several days. It is sure and safe. Or fine powdered sage, mixed with honey; a teaspoonful for a dose. Sweetened milk, with the addition of a little alum, will turn the worms. Flour of sulphur, mixed with honey, is very good. Heat very hot, in a smith's furnace, a piece of steel; lay on it a roll of brimstone, melt the steel, let it fall into water, and it will be in round lumps. Pound them very fine, mix the dust with molasses. Give half a teaspoonful night and morning, fasting. Or, give as much as will lie on a sixpence, of dried mandrake roots, powdered and mixed with honey, in the morning, three or four times successively. If a child have fits, proceeding from worms, give as much paregoric as it can bear; it will turn the worms and ease the child. To prevent worms, let children eat onions, raw or cooked. Raw are the best. Salt and water will turn worms, and a dose or two of flour of sulphur after, will bring them away, without any other medicine.

Dysentery Specific, particularly for Bloody Dysentery in Adults and Children.—Take 1 pound gum arabic, one ounce gum tragacanth, dissolved in 2 quarts of soft water, and strained. Then take 1 pound of cloves, ½ pound cinnamon, ½ pound allspice, and boil in 2 quarts of soft water, and strain. Add it to the gums, and boil all together over a moderate fire, and stir into it 2 pounds of loaf sugar. Strain the whole again when you take it off, and when it is cool, add to it half a pint sweet tincture of rhubarb, and a pint and a half of best brandy. Cork it tight in bottles, as the gums will sour, if exposed; if corked properly, it willkeep for years.

Piles.—Make an ointment, of equal parts, of sage, parsley, burdock, and chamomile leaves, simmer half an hour in fresh butter or sweet oil and lard; then rub the parts affected with it.

For Tetter, Ringworm, and Scald Head.—One pound simple cerate; sulphuric acid, ¼ pound; mix together, and ready for use.

Remedy for Rheumatism.—Peel off the outside bark of

the elder, scrape off the green bark that is under it, and stew in lard till it is crisp.

This is a most valuable salve, and of positive efficacy in cases of burns, sores, &c.

Bitters.—Garden salendine, black cherry inside bark, poplar inside bark, and century herb, in equal proportions.

Canker Cure.—Take 1 large teaspoonful of water, 2 teaspoonfuls of honey, 2 of loaf sugar, 3 of powdered sage, 2 of powdered goldthread, and 1 of alum. Stir up all together ; put into a vessel, and let it simmer moderately over a steady fire. An oven is better. Then bottle for use. Give a teaspoonful occasionally through the day.

Cure for Rheumatism.—One gill of alcohol, one of beef's gall, 1 of spirits of turpentine, one of sweet oil, and ounces 4 of camphor gum. Put them all in a bottle and shake it up ; use it two or three times a day, a teaspoonful at a time. Apply it, to the parts affected, before the fire. It is good, also, for frost-bites.

For a Weak Back.—Take a beef's gall, pour it into 1 pint alcohol, and bathe frequently. It acts like a charm.

Lemon Syrup for a Cough.—To a pint and a half of water add 2 large poppy-heads and 2 large lemons. Boil them till they are soft, press the lemons into the water, strain the liquor, and add ½ a drachm of saffron. and ½ a pound of brown sugar-candy, pounded. Boil all together till the sugar-candy is dissolved ; stir the whole till you perceive it will jelly ; strain it a second time, and it is ready.

Cure for Corns.—Tie a piece of raw cotton to the corn, and wet it several times a day with spirits of turpentine ; this will, in three days, cure the corn without the least apparent pain.

Cholera Morbus.—Take 2 ounces of the leaves of the bene plant, put them in ½ a pint of cold water, and let them soak an hour. Give 2 tablespoonfuls hourly, until relief is experienced.

Cure for Neuralgia.—Half a drachm of sal ammoniac in an ounce of camphor water ; to be taken a teaspoonful

at a dose, and the dose repeated at intervals of five minutes, if the pain be not relieved at once.

Tonic.—The following is the tonic used by reformed drunkards to restore the vigor of the stomach. Take of gentian root, ½ ounce; valerian root, 1 drachm, best rhubarb root, 2 drachms; bitter orange peel, 3 drachms; cardamom seeds, ½ an ounce, and cinnamon bark 1 drachm Having bruised all the above together in a mortar (the druggist will do it, if requested), pour upon it 1½ pints of boiling water, and cover up close; let it stand till cold; strain, bottle, and cork securely; keep in a dark place. Two tablespoonfuls may be taken every hour before meals, and half that quantity whenever the patient feels that distressing sickness and prostration, so generally present for some time after alcoholic stimulants have been abandoned.

Cure for Cancer.—Boil fine Turkey figs in new milk, which they will thicken; when they are tender, split, and apply them, as warm as can be borne, to the part affected, whether broken or not; the part must then be washed, every time the poultice is changed, with some of the milk; use a fresh poultice night and morning, and at least once during the day, and drink a quarter of a pint of the milk the figs are boiled in, twice in the twenty-four hours. If the stomach will bear it, this must be persevered in three or four decades at least. A man, aged 105 years, was cured, about six years before his death, with only 6 pounds of figs. The cancer, which began at the corner of his mouth, had eaten through his jaw, cheek, half-way down his throat; yet it was so perfectly cured as never to show any tendency to return. Should it ever do so, the figs should be again applied. The first application gives a good deal of pain, but afterwards each dressing gives relief.

For the Cure of Corns.—Take 2 ounces of gum ammoniac, 2 ounces of yellow wax, and 6 drachms of verdigris, melt them together and spread the composition on soft leather. Cut away as much of the corn as you can, then apply the plaster, and renew it every fortnight, till the corn is eradicated.

How to Cure Deafness.—Temporary deafness, arising from cold, sitting in a draught, and other causes, may be relieved and cured by letting fall into the ear ten drops of a mixture of sweet oil and one of glycerine every night, until the duct which leads from the ear to the nose is cleared ; this will be known by the sensation of the fluid passing from the ear into the nostril.

Brandreth's Pills.—Take 2 pounds of aloes, 1 pound of gamboge, 4 ounces of extract of colocynth, ½ a pound of castile soap, 2 fluid drachms of oil of peppermint, and 1 fluid drachm of cinnamon. Mix, and form into pills.

Pills for Sick Headache.—1½ drachm castile soap, 40 grains rhubarb, 20 drops oil of juniper and syrup of ginger enough to form 20 pills. Take two or three occasionally.

Eruption Ointment, for Frosted Feet, &c.—Chrome yellow and hog's lard.

Warts.—Frequently wash them with a strong decoction of oak bark, or wet lunar caustic, and rub it on the warts a few times.

Malone's Mixture for a Cough or Cold.—Take one teacup of flaxseed, soak all night. In the morning put in a kettle, 2 quarts of water, a handful, split up, of licorice root, ¼ of a pound of good raisins, broke in half. Let them boil until the strength is thoroughly extracted, then add the flaxseed, which has been previously soaked. Let all boil about half an hour more, watching and stirring, that the mixture may not burn. Then strain and add lemon-juice and sugar to taste. Take any quantity, cold, through the day, and half a thimbleful, warm, at night. The above is a most excellent recipe.

How to Cure Cancer.—The following is said to be a sure cure for cancer : A piece of sticking plaster is put over the cancer, with a circular piece cut out of the centre, a little larger than the cancer, so that the cancer and a small circular rim of healthy skin next to it is exposed. Then a plaster, made of chloride of zinc, blood-root, and wheat flour, is spread on a piece of muslin the size of this circular opening, and applied to the cancer for twenty-four hours. On removing it, the cancer will

be found burned into and appear of the color and hardness of an old shoe sole, and the circular rim outside of it will appear white and parboiled, as if scalded by hot steam. The wound is now dressed, and the outside rim soon separates, and the cancer comes out in a hard lump and the place heals up. The plaster kills the cancer, so that it sloughs like dead flesh, and never grows again. The remedy was discovered by Dr. Fell, of London, and has been used by him for six or eight years with unfailing success, and not a case has been known of the reappearance of the cancer when this remedy has been applied.

Cough Syrup.—Take equal parts of licorice, gum arabic, sweet spirits of nitre, antimonial wine, and paregoric ; dissolve the licorice and gum arabic in a pint of boiling water, then add the rest, and mix. Dose : a wineglassful night and morning.

Wild Cherry Bitters.—Boil a pound of wild cherry bark in a quart of water till reduced to a pint. Sweeten and add a little rum to preserve, or, if to be used immediately, omit the rum. Dose : a wineglassful three times a day, on an empty stomach.

A Certain Cure for Drunkenness.—Sulphate of iron, 5 grains ; magnesia, 10 grains ; peppermint water, 11 drachms ; spirits of nutmeg, 1 drachm ; twice a day. This preparation acts as a tonic and stimulant, and so partially supplies the place of the accustomed liquor, and prevents that absolute physical and moral prostration that follows a sudden breaking off from the use of stimulating drinks.

Blackberry Cordial.—To 1 quart of blackberry juice, add 1 pound of white sugar, 1 tablespoonful of cloves, 1 of allspice, 1 of cinnamon, and 1 of nutmeg. Boil all together fifteen minutes ; add a wineglass of whisky, brandy, or rum. Bottle while hot, cork tight, and seal. This is almost a specific in diarrhœa. One dose, which is a wineglassful for an adult—half that quantity for a child—will often cure diarrhœa. It can be taken three or four times a day if the case is severe.

Liniment for Burns.—Take equal parts of olive oil, fresh linseed oil, and lime water. Shake well together,

Brown's Bronchial Troches.—Take 1 pound of pulverized extract of licorice, $1\frac{1}{2}$ pounds of pulverized sugar, 4 ounces of pulverized cubebs, 4 ounces of pulverized gum arabic, and 1 ounce of pulverized extract of conium. Mix.

Lip Salve.—Take 1 ounce of oil of almonds, $\frac{1}{4}$ ounce of spermaceti, and $\frac{1}{4}$ drachm of prepared suet, with any simple vegetable coloring to fancy; simmer these until thoroughly mingled; as soon as taken off the fire, stir into the mixture three or four drops of tincture of capsicum, and when nearly cold, five or six drops of oil of rhodium. 2. Take hog's lard, washed in rose-water, $\frac{1}{2}$ pound; red and damask rose leaves, bruised, $\frac{1}{4}$ pound; work them well together in a mortar, and let them lay two days; then melt the lard, and strain it; add to the lard the same quantity of rose leaves, let them lay two days, as before, simmer in a water-bath, and strain, stirring in five or six drops of otto of roses. Put into pots or boxes for use. This is a beautiful scarlet salve.

Eye Water.—Take 1 pint of rose water, and add 1 teaspoonful each of spirits of camphor and laudanum. Mix and bottle. To be shaken and applied to the eyes as often as necessary. Perfectly harmless.

HAIR OILS, POMATUMS, &c.

Many persons object to using pomatums, oils, or any oily substance for their hair, as they consider it an injurious practice. So it is, if carried to excess, as it tends to stop up the pores of the skin through which the roots of the hair receive nourishment; but, on the other hand, alcoholic preparations, which many advocate as substitutes for the former, are very far from being unobjectionable; they keep the pores open, it is true, and the head clean, but they keep the hair in a state of dryness which is very injurious to it, more so by far than would ever be the result from the moderate use of a good pomatum or

hair oil ; still we think that a mixtre of oil and alcohol is best, as combining the qualities of both, while the defects are mutually destroyed by the union.

The following recipes embrace the best of each kind. They may be varied, however, to suit taste. The *best* materials should always be used, and care should be taken to see that the grease used is entirely free from rancidity or impurities. If intended for sale, they should be put up in neat bottles or boxes, with a tasty label. As all preparations for the hair have an immense sale, money can be readily made by the manufacture of a good article.

To make the Whiskers Grow.—Shave the beard at least three times a week, and use the following as a stimulant: cologne, 1 ounce ; alcohol, 1 pint; castor oil, ½ pint; oil of cloves, 20 drops ; oil of bergamot, 20 drops ; tincture of cantharides, 2 ounces.

Cosmetic Wash for the Hair.—Red wine, 1 pound; salt, 1 drachm; sulphate of iron, 2 drachms; boil for a few minutes, and add common verdigris, 1 drachm; leave it on the fire 2 minutes; withdraw it, and add 2 drachms of powdered nutgall. Rub the hair with the liquid ; in a few minutes dry it with a warm cloth, and afterwards wash with water.

Oil of Roses for the Hair.—Olive oil, 2 pints ; otto of roses, 1 drachm ; oil of rosemary, 1 drachm. Mix. It may be colored red by steeping a little alkanet root in the oil (with heat) before scenting it. It strengthens and beautifies the hair.

Macassar Oil.—Olive oil, 1 pound ; oil of origanum, 1 drachm ; oil of rosemary, 1¼ drachms. Mix. Its tendency is to make the hair grow fast and to curl.

Hard Pomatum.—Hard pomatum is made by melting slowly together 1 pound of prepared suet and 3 ounces of white wax, perfuming it with any favorite essential oil.

Oil to Promote the Growth of the Hair.—Castor oil, ½ pint ; alkanet root, ½ ounce ; oil of bergamot, 10 minims ; oil of cloves, 10 minims ; civet, 1½ grains. The castor oil must be gently heated ; when sufficiently hot, it

should be poured upon the alkanet root, which immediately communicates its color. It must then be strained, and, when cold, the other ingredients are to be stirred into it. This oil will not only promote the growth of the beard, whiskers, and moustaches in youths, but will also strengthen and improve the hair in every respect.

Family Oil for the Hair.—Oil of sweet almonds, 1 gill; spermaceti, $\frac{1}{4}$ ounce. Melt them together over the fire, first breaking the spermaceti into very small pieces. When cold, stir in a few drops of oil of bergamot, rubbed up with $\frac{1}{2}$ grain of civet.

Oil for the Hair.—A very excellent ready-made oil for the hair, which answers all common purposes, is made by mixing one part brandy with three parts of sweet oil. Add any scent you prefer.

A Capital Pomade.—Dissolve thoroughly, over a slow fire, 2 ounces of white wax and $\frac{1}{2}$ ounce palm oil, with a flask of the best olive oil. Stir it till nearly cold; then add 1 ounce of castor oil, and about three pennyworth of bergamot, or any other perfume you please.

Bandoline for the Hair.—This mixture is best made a little at a time. Pour a tablespoonful of boiling water on a dozen quince seeds, and repeat when fresh is required.

Oil to make the Hair Curl.—Olive, 1 pound; oil of origanum, 1 drachm; oil of rosemary, $1\frac{1}{4}$ drachms.

Rose Pomatum.—Melt 1 ounce of white wax with 1 ounce of mutton suet, and add two ounces of sweet oil. Color the mass with alkanet, and perfume with oil of roses.

Ox Pomatum.—Melt 4 ounces of ox marrow with 1 ounce of white wax and 6 ounces of lard. Perfume the mass, when cooling, with oil of bergamot.

Bears' Oil.—The best description of lard oil, properly perfumed, is far preferable to any other kind of oil. Perfume as desired, but be sure to get a good, sweet article.

To Increase the Growth of Hair and Cleanse the Head.—Take a spoonful of hartshorn and three times the quantity of rain water, rub the head with the hand until it produces a lather, and dry it with a cloth. This gives

the hair a soft and glossy appearance, and, if applied twice a week, will, in a short time, cause the hair to grow over bald places. Young gentlemen will find a benefit in using it on their whiskers, as it will make them grow soft and even. Excess in the use of it will produce a contrary effect.

Arnica Hair Wash.—When the hair is falling off and becoming thin, from the too frequent use of castor, Macassar oils, &c., or when premature baldness arises from illness, the arnica hair wash will be found of great service in arresting the mischief. It is thus prepared : take elder water, ½ a pint ; sherry wine, ½ a pint ; tincture of arnica, ½ an ounce , alcoholic ammonia, 1 drachm—if this last-named ingredient is old, and has lost its strength, then two drachms instead of one may be employed. The whole of these are to be mixed in a lotion bottle, and applied to the head every night with a sponge. Wash the head with warm water twice a week. Soft brushes only must be used during the growth of the young hair.

What causes the Hair to turn Gray.—It has been recently asserted that an undue proportion of lime in the system is the cause of premature gray hair, and we are advised to avoid hard water, either for drinking pure or when converted into tea, coffee, or soup, because hard water is strongly impregnated with lime. Hard water may be softened by boiling it : let it become cold, and then use it as a beverage. It is also stated that a liquid that will color the human hair black, and not stain the skin, may be made by taking one part of bay rum, three parts of olive oil, and one part of good brandy, by measure. The hair must be washed with the mixture every morning, and in a short time the use of it will make the hair a beautiful black, without injuring it in the least. The articles must be of the best quality, mixed in a bottle, and always shaken well before being applied.

To Prevent Gray Hair.—When the hair begins to change color, the use of the following pomade has a beneficial effect in preventing the disease extending, and has the character of even restoring the color of the hair in

many instances : Lard, 4 ounces ; spermaceti, 4 drachms ; oxide of bismuth, 4 drachms. Melt the lard and spermaceti together, and when getting cold stir in the bismuth ; to this can be added any kind of perfume, according to choice. It should be used whenever the hair requires dressing. It must not be imagined that any good effect speedily results ; it is, in general, a long time taking place, the change being very gradual.

Ammoniacal Pomatum for Promoting the Growth of Hair.—Take almond oil, $\frac{1}{4}$ of a pound ; white wax, $\frac{1}{2}$ an ounce ; clarified lard, 3 ounces ; liquid ammonia, a $\frac{1}{4}$ fluid ounce ; otto of lavender, and cloves, of each 1 drachm. Place the oil, wax, and lard in a jar, which set in boiling water ; when the wax is melted, allow the grease to cool till nearly ready to set, then stir in the ammonia and the perfume, and put into small jars for use. Never use a hard brush, nor comb the hair too much. Apply the pomade at night only.

To Remove Dandruff.—Take a thimbleful of powdered refined borax, let it dissolve in a teacupful of water, first brush the head well, then wet a brush and apply it to the head. Do this every day for a week, and twice a week for a few times, and you will effectually remove the dandruff.

Pomade against Baldness.—Macerate a drachm of powdered cantharides in an ounce of spirits of wine. Shake it well during a fortnight, and then filter. Take ten parts of this tincture, and rub it with ninety parts of cold lard. Add a little essence of bergamot, or any other scent. Rub this pomade well into the head, night and morning. In ninety-nine cases out of a hundred, this application, if continued, will restore the hair. Another receipt : Take of extract of yellow Peruvian bark, 14 grains ; extract of rhatany root, 8 grains ; extract of burdock root, and oil of nutmegs (fixed), of each 2 drachms ; camphor (dissolved with spirits of wine), 15 grains ; beef marrow, 2 ounces ; best olive oil, 1 ounce ; citron juice, $\frac{1}{2}$ a drachm ; aromatic essential oil, as much as sufficient to render it fragrant ; mix, and make into an ointment. Two drachms of bergamot, and a few drops

of otto of roses would suffice. This is considered a valuable preparation for the hair, and is to be used as the above.

Hair Invigorator.—Bay rum, 2 pints; alcohol, 1 pint; castor oil, 1 ounce; carb. ammonia, ½ ounce; tincture of cantharides, 1 ounce. Mix them well. This compound will promote the growth of the hair and prevent it from falling out.

Rose Pomatum.—Prepared lard, 16 ounces; prepared suet, 2 ounces; melt with a gentle heat, and add 2 ounces of otto of water, and 6 drops of otto of roses. Beat them well together, and pour into pots before it is cold. For making jessamine, violet, and orange pomade, put the same quantity of water, and one drachm of the required essence.

Pomade for Beautifying the Hair.—Oil of sweet almonds, 1 pint; spermaceti, 1½ ounces, purified lard, 2 ounces; melt gently, and, when nearly cold, add any agreeable scent, and pour into pots or wide-mouthed bottles.

Bears' Grease (artificial).—Bears' grease is imitated by a mixture of prepared veal suet and beef marrow. It may be scented at pleasure. The following are some of the best compounds sold by that name:

1. Prepared suets, 3 ounces; lard, 1 ounce; olive oil, 1 ounce; oil of cloves, 10 drops; compound tincture of benzoin, 1 drachm. Mix.

2. Lard, 1 pound; solution of carbonate of potash, 2 ounces. Mix.

3. Olive oil, 3 pints; white wax, 3 ounces; spermaceti, 1 ounce; scent with oil of roses and oil of bitter almonds.

Hard Pomatum.—Beef suet, 16 ounces; white wax, 1 ounce; with 1 drachm of oil of lavender or bergamot.

2. Beef suet, 5 pounds; white wax, 8 pounds; spermaceti, 2 ounces; oil of lavender, 1 ounce. Mix.

Colored Pomatums.—The coloring matter employed to color pomatums are anotta, alkanet, carmine, indigo, cobalt, umber, ivory-black, &c.

Castor Oil Pomade.—Castor oil, 4 ounces; white wax, 6 drachms; essence of bergamot, 2 drachms; oil of laven-

der, 20 drops; eau de Cologne, ½ drachm; prepared lard, 2 ounces. Mix.

Crystalline Cream.—Oil of almonds, 8 ounces; spermaceti, 1 an ounce; melt together; when a little cooled, add ½ an ounce of any desired essence.

Circassian Cream.—1 pint of olive oil; 3 ounces white wax; 2 ounces, spermaceti; ½ ounce, of alkanet root. Digest the oil with the alkanet till sufficiently colored, strain, melt the wax and spermaceti with the oil, and, when sufficiently cool, add 2½ drachms oil of lavender, drachm of essence of ambergies.

Oil of Roses.—Fine olive oil, 1 pint; otto of roses, 16 drops. If required red, color with alkanet root, and strain before adding the otto. For common sale, essence of bergamot or of lemon is often substituted, wholly or in part, for the expensive otto.

Marrow Oil.—Clarified beef marrow, or marrow pomatum, with enough almond or olive oil to bring it to the required consistency.

Pomade de Jennesse.—Pomatum, mixed with magistery of bismuth. It is said to turn the hair black.

Chinese Depilatory (to remove superfluous hair).—Crystallized hydrosulphate of soda, 3 parts; quicklime, in powder, 10 parts; starch, 10 parts Mix. To be mixed with water, and applied to the skin, and scraped off in 2 or 3 minutes, with a wooden knife.

2. Quicklime, 16 ounces; pearlash, 2 ounces; reduce to fine powder and keep in a close bottle. Use as above.

Pomade for False Curls.—Melt together, in an earthen pipkin, 24 ounces of Burgundy pitch and 8 ounces of white wax; add 1 ounce of pomatum; remove from the fire, and add 4 ounces of brandy or other spirit; replace it on the fire till it boils slightly, then strain through linen, adding bergamot or other perfume, and cast in molds.

Treatment for Baldness.—A loosening of the hair frequently occurs in young persons, as well as those of the middle period of life; this, if neglected, becomes real baldness. But, if proper treatment be pursued, the hair will grow afresh, and assume all its pristine strength.

A useful practice in men, and those of the opposite sex whose hair is short, is to immerse the head in cold water morning and night, dry the hair thoroughly, and then brush the scalp until a warm glow is produced. In women with long hair this plan is objectionable, and a better one is to brush the scalp until redness and a warm glow are produced, then dab among the roots of the hair the following lotion : Vinegar of cantharides ½ an ounce ; eau de Cologne, 1 ounce ; rose water, 1 ounce. Mix. If the lotion produce smarting, or tenderness, the brush may be laid aside ; but if no sensation is occasioned, the brushing should be resumed, and a second application of the lotion be made. This treatment should be practiced once or twice a day, or at intervals of a few days, according to the state of the scalp ; namely, if tender, less ; if insensible, more frequently. When the baldness happens in patches, the skin should be well brushed with a soft tooth-brush, dipped in distilled vinegar, morning and evening, or dipped in the lotion above mentioned. If the lotion should have the effect of making the hair harsh and dry, this inconvenience may be removed by the use of oil or pomatum after each application of the lotion.

Curling the Hair.—At any time you may make your hair curl the more easily by rubbing it with the beaten yolk of an egg, washed off afterwards with clear water, and then putting on a little pomatum before you put up your curls. It is well always to go through this process when you change to curls, after having worn your hair plain.

Black Pomatum (in sticks).—Prepared lard, melted, with a third, in winter, and a half its weight in summer, of wax, and colored with powdered ivory-black, and strained through tammy, or any substance that will permit the fine particles of ivory-black to pass through. Stir it constantly, and when it begins to thicken, pour it into paper molds.

Brown and Chestnut Pomatums are prepared in the same way, but colored with umber, &c.

Hair Restorative.—Take 1 drachm lac sulphur, and ½

drachm sugar of lead, and add 1 pint of rose-water. Use once a day (shaking the bottle before using), and it will gradually change the hair dark ; it will also promote its growth.

A Good Hair Oil.—Take 1 pint of castor oil and 1 pint of cocoa-nut oil, add ½ pint of alcohol, and perfume with oil of lemon and oil of bergamot.

Rosemary Hair Oil.—Take castor oil, 1 pint ; sweet oil, ⅓ pint ; lard oil, ¼ pint ; alcohol, a tablespoonful. Perfumed with rosemary.

Phalon's Hair Oil.—Cocoanut oil. perfumed with oil of almonds.

HAIR DYES.

1. Take 3 parts of litharge and 2 parts of quick lime, both in an impalpable powder and mix them carefully. When used, a portion of the powder is mixed with hot water or milk, and applied to the hair, the part being afterwards enveloped in oil-skin for 4 or 5 hours.

2. Litharge, 2 parts ; slaked lime, 1 part ; chalk, 2 parts ; all finely powdered, and accurately mixed. When required for use, mix the powder with warm water, and dip a brush in the mixture, and rub the hair well with it. After 2 hours let the hair be washed.

3. Mix 5 drachms of fresh slaked lime with 1½ ounces of water; strain through silk, and bottle. Dissolve 5 drachms of acetate of lead in sufficient water, and add enough slaked lime to saturate the acetate acid (a drachm), let it settle, pour off the supernatant liquor, wash the precipitate with water, and add it to the milk of lime in the bottle.

4. Sifted lime, 16 ounces ; white lead, 2 ounces ; litharge, in fine powder, 1 ounce ; mix well together and keep dry, To dye *black*, mix a little of the powder with water to the consistence of cream. To dye *brown*, use milk, instead of water. Apply with a small sponge to every hair.

5. Litharge 4½ ounces ; quicklime, ¾ ounce ; reduce

to an impalpable powder, and pass it through a sieve. Keep it in a close bottle. When used, wash the hair with soap and water; then with tepid water; wipe it dry and comb with a clean comb. Mix the dye in a saucer, with hot water, to the consistence of cream, and apply it to the hair, beginning at the roots. Place over it four folds of brown paper, saturated with hot water, and drained till cool; and over this an oil-skin cap and a nightcap. Let it remain 4 to 8 hours, according to shade desired. When removed, oil the hair, but do not wet it for 3 or 4 days.

6. Levigated litharge, 11 ounces; powdered quicklime, 75 ounces; hair powder, 37 ounces. Mix. When used, a portion of the powder is mixed with warm water in a saucer, and applied to the hair with the fingers, taking care to cover the hair to the roots. Cover the whole with a sheet of cotton wadding moistened with water, and this with a folded cloth. Let it remain on for 3 hours, or, better, for the night.

The following dyes are composed of solutions of nitrate of silver, and in applying them it should be remembered that they stain the *skin*, as well as the hair. There is, therefore, more difficulty in applying them; they are, however, thought to give a better color to the hair than the ones we have given above:

1. Nitrate of silver, 11 drachms; nitric acid, 1 drachm; distilled water, 1 pint; sap green, 3 drachms; gum arabic, 1 drachm. Mix.

2. Nitric acid, 1 drachm; nitrate of silver, 10 drachms; sap green, 9 drachms; mucilage, 5 drachms; distilled water, 37½ fluid ounces.

3. Silver, 2 drachms; iron filings, 4 drachms; nitric acid, 1 ounce; distilled water, 8 ounces; digest and decant the clear solution. To be carefully applied with a close brush.

4. Sulphuretum of potassæ, 2 drachms; caustic of potassæ, 1 drachm; nitrate of silver, crystallized, 1 drachm; tincture of galla, 1 ounce.

THE TEETH AND GUMS.

Great care should be taken of the teeth to prevent their decaying, and to keep them free from dirt, which will injure the teeth, besides giving them an unsightly appearance. Some articles for the teeth, which are sold by unprincipled persons, contain powerful acids, to which they owe their power for removing dirt; these should be avoided, as, while they clean the teeth, they destroy the enamel, and would, if used often, entirely *eat away* the tooth.

The articles below are the best for the teeth, and are readily sold.

TOOTH POWDER.

General Directions.—The dry ingredients should be finely pulverized, and the whole well mixed; which is best effected by agitating the powder in a bottle, and afterwards passing the whole through a sieve. Some ingredients are usually *levigated*, or ground with water, as prepared chalk, coral, &c. For children, only the ones which contain very soft powders should be allowed. The heavy carbonate of magnesia is very suitable for them.

Tooth Powder.—Take powdered charcoal and white sugar, 1 ounce each; Peruvian bark, ½ ounce; cream of tartar, 1½ drachms; carnella, 24 grains. Rub them well together and pulverize in a mortar. The above powder will cleanse the teeth, strengthen the gums, sweeten the breath, and prevent the toothache.

2. Take pumice stone and cuttle-fish bone, of each ½ ounce; vitriolated tartar and mastic, of each 1 drachm; oil of rhodium, 4 drops. Mix all into a fine powder

Antiseptic Tooth Powder.—Prepared chalk, 2 ounces; dry chloride of lime, 10 grains; oil of cloves, 5 drops. Mix. It may be colored, if preferred, by a little levigated bole.

Antiscorbutic Tooth Powder.—Extract of rhatany, ½ ounce; prepared charcoal, 2 ounces; cinnamon, ¼ ounce; cloves, ¼ ounce.

Aromatic Tooth Powder.—Calamus, 4 drachms ; charcoal, 1 drachm ; soap, 1 drachm ; oil of cloves, 12 drops.

Asiatic Tooth Powder.—Prepared coral, 4 ounces ; Venetian red, 3 drachms ; ochre, 5 drachms ; pumice, 5 drachms; musk, 1 grain. Mix. Or, bole, 3 parts; chalk, 2 parts; ochre, 1 part; pumice, 1 part; musk to scent.

Cartwright's Dentrifrice.—Prepared chalk, 1 ounce; orris, 1 ounce; castile soap, ½ drachm.

Prepared Charcoal.—The charcoal made in iron cylinders, from willow, is preferred. It should be reduced to an impalpable powder, and kept from the air.

Charcoal Tooth Powder.—Prepared charcoal, 1 ounce; prepared chalk, 3 ounces.

Charcoal Tooth Powder—French.—Prepared charcoal, 1 ounce; sugar, 1 ounce; oil of cloves, 3 drops. Mix.

French Tooth Powder.—Peruvian bark, burnt crust of bread, and sugar, in equal proportions.

German Tooth Powder.—Peruvian bark, 6 drachms; red sanders, 2 drachms; oil of cloves and bergamot, each 5 drops.

Myrrh Dentrifrice.—Myrrh, 1 ounce; cuttle-fish bone, 4 ounces; orris, 3 ounces. Mix.

2. Myrrh, ½ ounce; cuttle-fish bone, prepared chalk, orris, of each 1 ounce; cassia, ½ ounce. Mix.

Palmer's Tooth Powder.—Prepared chalk, 1 pound; camphor, 1 ounce; orris, 1 pound; cuttle-fish bone, 4 ounces; rose pink, 1 ounce.

Rhatany Tooth Powder.—Rhatany root, 2 ounces; cuttle-fish bone, 4 ounces; prepared chalk, 8 ounces; borax, 1 drachm.

Russian Tooth Powder.—Peruvian bark, 2 ounces; orris root, 1 ounce; sal ammoniac, ½ ounce; catechu, 6 drachms; oil of cloves, 6 or 8 drops.

Violet Tooth Powder.—Orris root, 2 ounces; cuttle-fish bone, 4 ounces; precipitated chalk, 12 ounces; bicarbonate of soda, ½ ounce; essence of violets, 1 drachm; rose pink enough to give it a pale violet color.

Bark Tooth Powder.—Charcoal, 4 parts; yellow bark, 1 part.

TOOTH PASTES.

Any of the above powders can be formed into a paste with honey, clarified honey, or honey of roses. A little perfumed spirit may be added. A common objection to these pastes, is their liability to fermentation or effervescence. Some makers keep the paste in bulk for a considerable time, till the effervescence has entirely subsided, and then put it up in pots for sale. Others heat the honey, stir in the powders, and keep the mixture warm till any effervescence produced by the action of the acidity of the honey on the cretaceous powders has subsided.

LIQUID PREPARATIONS FOR THE TEETH.

Odoriferous Tincture of Myrrh.—Choice Turkey myrrh, 3 ounces; eau de Cologne, 1 quart; digest for 7 days, and filter.

2. To 18 fluid ounces of tincture of myrrh, add 2 ounces of essence of cologne (see *Perfumery*). If the tincture should not be quite clear, add a grain or so of burnt alum, shake frequently, and filter in a day or two.

Antiscorbutic Elixir.—Cinchona, 3 ounces; guaiacum, 5 ounces; pellitory, 3 ounces; orange peel, 2 drachms; cloves, 5 drachms; safron, ½ drachm; benzoin, 2 drachms; spirits of wine or brandy, 32 ounces; digest and filter.

Extract of Pellitory—Pellitory root, 5 ounces; cinchona, 1 ounce; benzoin, 1½ drachms; essence of peppermint, 3 drachms; brandy 1 quart.

Elixir of Roses.—Cloves, 1 drachm; cinnamon, 3 ounces; ginger, 2 ounces; spirits of wine, 2½ pints; oil of orange, 1 drachm; otto of roses, 15 drops; essence of peppermint, 1 ounce. Mix. Digest 15 days, and filter.

Eau de Bottot.—Aniseseed, 4 ounces; cinnamon, 1 ounce; cloves, 1 ounce; cochineal, 2 drachms; oil of mint, 2 drachms; spirits of wine or brandy, 8 pounds; macerate 8 days, and filter.

Odontalgic Elixir—Pellitory root, 2 ounces; simple spirits of lavender, 16 ounces; muriate of ammonia, ½ drachm; digest 24 hours and filter.

Dental Tincture.—Camphor, 4½ ounces; myrrh, 2 ounces; rectified spirits, 36 fluid ounces; distilled water, 8 ounces.

Eau pour les Dents.—Cinnamon, 2 ounces; cloves, 6 drachms; fresh lemon peel, 1½ ounces; dried rose petals, 1 ounce; scurvy grass, 8 ounces; spirits, 3 pounds; macerate 24 hours, and distil in a water bath.

Elixir for the Teeth.—Fresh roots of horse-radish, fresh leaves of scurvy grass and mint, each 6 drachms; guaiacum, cinchona, pellitory, calamus, and rhatany, each 5 drachms; proof spirits, 1 quart; macerate 16 days, and strain.

French Elixir.—Rose water, 16 ounces; spirits of scurvy grass, 2 ounces; tincture of galbanum, 1 ounce; color with cochineal.

Lotion of Chlorinated Soda, for purifying the breath, cleansing the mouth, removing unpleasant odors, &c. Liquid chlorinated soda, 1 ounce; distilled water, 19 ounces. Mix. A teaspoonful in a glass of water; the same direction applies to most of the above.

Tinctures for Toothache.—These are applied by moistening a little cotton wool or lint with the liquid, and introduced into the cavity of the decayed tooth. Where there is no cavity, they are sometimes applied to the gums surrounding the affected tooth. Most of them are stated by their inventors to give "immediate relief." The cavity should be dried with lint before applying the remedy.

1. Water of ammonia, with half the quantity of tincture of opium; applied as above.

2. Creosote, 1 drachm; spirits of camphor, 2 drachms. Creosote is also used alone. Camphor alone is also good.

3. Finely powdered alum, 1 drachm; spirit of nitric ether, 7 drachms.

4. Bruised pellitory, ½ ounce; camphor, 3 drachms; opium, 1 drachm; oil of cloves, ½ drachm; rectified spirit, 6 ounces. Digest ten days, and strain.

5. Pellitory, ginger, cloves, camphor, of each one ounce; tincture of opium, 4 ounces; spirit of wine, 16 ounces. Macerate eight days, and strain.

6. Camphor, 1 drachm; ether, 4 drachms Dissolve

7. Rectified spirit, 1 ounce; camphor, ½ ounce; opium, 1 scruple; oil of cloves, 80 drops.

8. Oil of rosemary, 2 ounces; tincture of galbanum, 1 ounce. Mix. Cotton wet with this is to be introduced into *ears*.

9. Alcohol, 4 drachms; creosote, 6 drachms; tincture of cochineal, 2 drachms; oil of peppermint, 3 drops.

PILLS, OR PASTES, FOR TOOTHACHES.

1. Opium, 12 grains; cajeput oil, 4 drops; tincture of cantharides, 4 drops; extract of henbane and of belladonna, each 24 grains; distilled water of opium, sufficient quantity.

2. Powdered opium, 1 ounce; mastic, 2 drachms; sandarach, 2 drachms; dragon's blood, ½ drachm; oil of rosemary, 8 drops; spirit of wine to form a paste. To be applied near the affected tooth.

3. Powdered alum, 1 drachm; powdered mastic, ½ drachm; spirit of nitric ether, sufficient to form a paste.

4. Opium, 5 grains; oil of cloves, 3 drops; extract of henbane, 5 grains; extract of belladonna, 10 grains; powdered pellitory, sufficient to form a paste.

CEMENTS FOR FILLING TEETH.

These are harder than the preceding, and intended to remain in the tooth for an indefinite time. They will often make the tooth almost "as good as new," and may enable a person to preserve his teeth, instead of having them extracted. In all cases the cavity in the tooth should be previously cleared from all extraneous matters, and wiped perfectly dry with a piece of lint or blotting paper.

1. Mix 12 parts of dry phosphoric acid with 13 parts of pure and pulverized quicklime. It becomes moist in mixing, in which state it is introduced into the cavity of the tooth, where it quickly becomes hard.

2. Digest 9 parts of powdered mast[illegible] parts of

ether, and add enough powdered alum to form a stiff paste.

3. Gutta-percha, softened by heat, is recommended. Dr. Rollfs advises melting a piece of caoutchouc at the end of a wire, and introducing it while warm.

Metallic Cements.—Amalgams for the teeth are made with gold or silver, and quicksilver, the excess of the latter being squeezed out, and the stiff amalgam used warm. Inferior kinds are made with quicksilver and tin, or zinc. A popular nostrum of this kind consists of 40 grains of quicksilver and 20 of fine zinc filings, mixed at the time of using. The following is said to be the most lasting and least objectionable amalgam: Melt 2 parts of tin with 1 of cadmium, run it into an ingot, and reduce it to filings. Form these into a fluid amalgam with mercury, and squeeze out the excess of mercury through leather. Work up the solid residue in the hand, and press it into the tooth. Another cement consists of about 73 parts of silver, 21 of tin, and 6 of zinc, amalgamated with quicksilver.

Poudre Metallique.—The article sold under this name in Paris appears to be an amalgam of silver, mercury, and ammonium, with an excess of mercury, which is pressed out before using it.

PERFUMERY.

The too lavish use of pefumery of any kind should be avoided, as it shows a want of taste and refinement; but it is only the excess that is improper. In moderate quantities perfumery is used by the most cultivated and genteel persons.

The various kinds of eau de Cologne are the most popular and most generally used perfumes, but all these given in the following pages, have their admirers, and sell rapidly. They should be put up in fancy-shaped bottles, with white kid over the corks, or stopples, and be neatly labeled.

The spirit employed in perfumery should be selected with great care; it should be perfectly free from "grain-oil" and other impurities. It should be 60 over-proof, unless otherwise directed.

Essence of Lavender.—Essential oil of lavender, 3½ ounces; rectified spirit, 2 quarts; rose-water, ½ pint; tincture of orris, ½ pint.

Lavender Water.—Oil of lavender, 4 ounces; spirit, 3 quarts; rose-water, 1 pint. Mix and filter.

Odoriferous Lavender Water.—Rectified spirit, 5 gallons; essential oil of lavender, 20 ounces; oil of bergamot, 5 ounces; essence of ambergris, ½ ounce.

2. Oil of lavender, 3 drachms; oil of bergamot, 20 drops; nerolic, 6 drops; otto of roses, 6 drops; essence of cedrat, 8 drops; essence of musk, 20 drops; rectified spirit, 28 fluid ounces; distilled water, 4 ounces.

Eau de Cologne—Cologne Water.—Oil of lavender, oil of bergamot, oil of lemon, oil of neroli, each 1 ounce; oil of cinnamon, ½ ounce; spirit of rosemary, 15 ounces; highly rectified spirit, 8 pints. Let them stand 14 days, then distill in a water-bath.

2. Essential oils of bergamot, lemon, neroli, orange-peel, and rosemary, each 12 drops; cardamon seeds, 1 drachm; rectified spirit, 1 pint. It improves by age.

Honey Water.—Rectified spirit, 8 pints; oil of cloves, oil of lavender, oil of bergamot, each ½ ounce; musk, 8 grains; yellow sandus shavings, 4 ounces; digest for 8 days, and add 2 pints, each of orange-flower and rose water.

Otto of Roses.—Fill a large glazed earthen jar with rose leaves, carefully separated from the cups; pour upon them spring water, just sufficient to cover them, and set the jar with its contents in the sun for two or three days, taking it under cover at night. At the end of the third or fourth day, small particles of yellow oil will be seen floating on the surface of the water, and which, in the course of a week, will have increased to a thin scum. The scum is the otto of roses; take it up with a little cotton tied to the end of a stick, and squeeze it into a phial

Essence of Verbena Leaf.—Take rectified spirit of wine, ½ pint; otto of verbena, ½ drachm; otto of bergamot, 1 drachm; and tincture of tolu, ¼ ounce. Mix them together, and it is ready for use. This sweet scent does not stain the handkerchief and is very economical.

Essence of Musk.—Take one pint proof spirit, and add two drachms musk. Let it stand a fortnight, with frequent agitation.

A very pleasant Perfume and also Preventive against Moths.—Take of cloves, caraway seeds, nutmegs, mace, cinnamon, and Tonquin beans, of each 1 ounce; then add as much florentine orris root as will equal the other ingredients put together. Grind the whole well to powder and then put it in little bags, among your clothes, &c.

To extract the Perfume of Flowers.—Procure a quantity of the petals of any flower, which has an agreeable flavor: card thin layers of cotton wool, which dip into the finest Florence oil; sprinkle a small quantity of fine salt on the flowers, and place layers of cotton and flowers, alternately, until an earthen, or wide-mouthed glass vessel is quite full. Tie the top close with a bladder, and lay the vessel in a south aspect, exposed to the sun, and in fifteen days, when opened, a fragrant oil may be squeezed away from the whole mass; little inferior (if roses are used), to the dear, and highly-valued otto, or odor of roses.

Lisbon Water.—To rectified spirit, 1 gallon, add essential oils of orange peel and lemon peel, of each 3 ounces, and of otto of roses, ¼ ounce.

Queen of Hungary's Water.—Spirit of rosemary, 4 pints; orange-flower water, ¼ pint; essence of neroli, 4 drops.

Esprit de Bouquet.—Oil of lavender, oil of cloves, and oil of bergamot, each 2 drachms; otto of rose, and of oil cinnamon, each 20 drops; essence of musk, 1 drachm; rectified spirits, 1 pint. Mix.

Eau de Rosieres.—Spirits of roses, 4 pints; spirits of jessamine, 1 pint; spirits of orange flowers, 1pint; spirits of cucumber, 2¼ pints; spirits of celery seed, 2¼ pints;

spirits of angelica-root, 2¾ pints; tincture of benzoin, ¾ of a pint; balsam of Mecca, a few drops.

Eau de Violettes.—Macerate 5 ounces of fine orris root in a quart of rectified spirits, for some days, and filter.

Spirits of Orange flowers, Spirits of Elder flowers, and Spirits of Acacia flowers.—Fresh flowers, 1 pound; rectified spirits, 4 pounds or pints; water, 2 pounds; distil 4 pounds or pints.

Spirits of Orange peel, or Lemon peel, of Citron, and of Bergamot.—Fresh peel, 1 pound; rectified spirits, 6 pounds; macerate for 2 days, and distill in a water bath to dryness; or, 1 ounce of essential oil to 2 pints of spirits.

ESSENCES.

Essence of Neroli.—Spirits of wine, ½ pint; orange peel, cut small, 3 ounces; orris root in powder, 1 drachm; musk, 2 grains; let it stand in a warm place for three days, and filter.

Essence of Lemon.—Spirits of wine, ½ pint; fresh lemon-peel, 4 ounces; as above.

Essence of Bergamot.—Spirits of wine, ½ pint; bergamot peel, 4 ounces; as above.

Essence of Violets.—Spirits of wine, ½ pint; orris root, 1 ounce.

Essence of Cedrat.—Essence of bergamot, 1 ounce; essence of neroli, 2 drachms.

Essence of Musk.—Spirits of wine, ¾ pint; musk, 16 grains.

Essence of Ambergris.—Spirits of wine, ½ pint; ambergris, 24 grains.

Essence of Cloves.—Spirits of wine, ½ pint; bruised cloves, 1 ounce; other essences in the same manner.

Essence for Smelling Bottles.—Oil of lavender and essence of bergamot, each 1 drachm; oil of orange peel, 8 drops; oil of cinnamon, 4 drops; oil of neroli, 2 drops; alcohol and strongest water of ammonia, each 2 ounces.

Perfumed Powder or Boxes and Drawers.—Coriander powder, Florentine orris powder, powdered rose leaves, powdered sweet-scented flag-root, of each 2 ounces; lav-

ender flowers, powdered, 4 ounces; musk, 1 scruple; powder of sandlewood, 1 drachm. Mix.

Pastiles for Burning.—Benzoin, 2 ounces; balsam of tolu, ½ ounce; laudanum, 1 drachm; yellow sanders, ½ ounce; charcoal, 6 ounces; nitre, ¼ ounce; mucilage of tragacanth sufficient to mix. Reduce the substances to powder and form into a paste with the mucilage, and divide into small cones with a tripod base.

2. Benzoin, 1 ounce; cascarilla, 1 ounce; myrrh, 8 scruples; oil of nutmeg, 4 scruples; oil of cloves, 4 scruples; nitre, ½ ounce; charcoal, 6 ounces; mucilage of tragacanth sufficient to mix.

Incense.—Powdered cascarilla, 2 ounces; myrrh, styrax, benzoin, and Burgundy pitch, each 1 ounce. Mix.

Mouth Pastiles, for Perfuming the Breath.—Extract of licorice, 3 ounces; oil of cloves, 1½ drachms; oil of cinnamon, 15 drops. Mix, and divide into one-grain pills, and silver them.

2. Chocolate powder and ground coffee, each 1½ ounce; prepared charcoal, 1 ounce; sugar, 1 ounce; vanilla (pulverized with the sugar), 1 ounce; mucilage, sufficient to mix. Make into lozenges of any form, six or eight to be used daily, to disinfect the breath.

3. Catechu, 7 drachms; orris powder, 40 grains; sugar, 3 ounces; oil of rosemary (or of cloves, peppermint, or cinnamon), 4 drops. Mix, and roll flat on an oiled marble slab, and cut into very small lozenges.

Chlorine Pastiles, for Disinfecting the Breath.—Dry chloride of lime, 2 drachms; sugar, eight ounces; starch, 1 ounce; gum tragacanth, 1 drachm; carmine, 2 grains. Form into small lozenges.

2. Sugar flavored with vanilla, 1 ounce; powdered tragacanth, 20 grains; liquid chloride of soda sufficient to mix; add two drops of any essential oil. Form a paste, and divide into lozenges of 15 grains each.

COSMETICS FOR THE SKIN

As a general thing cosmetics of all kinds (except the most simple and harmless) should be avoided. Rouge and powders, although they may not be detected, cannot fail to injure the skin, whatever may be said to the contrary. The articles below are the best of the kind, and most of them are the most harmless that can be made. These articles sell rapidly and at a handsome profit. They should be put in a tasty and attractive style. Of course we only refer to the rouges, powders, and powerful cosmetics, as being dangerous, the simple washes, lotions, &c., are entirely innocent, and in many instances beneficial.

Camphor Tablet, for chapped hands, &c.—Melt tallow, and add a little powdered camphor and glycerine, with a few drops of oil of almonds to scent. Pour in molds and cool.

To Make the Complexion Fair.—Take emulsion of bitter almonds 1 pint; oxymuriate of quicksilver 2½ grains; and sal ammonia 1 drachm. Use moderately for pimples, freckles, tanned complexions, or scurf on the skin, by means of a sponge, after washing the face or hands with soft soap and warm water.

Lip Salves.—Take oil of almonds, 3 ounces; spermaceti, ½ ounce; virgin rice, ½ an ounce. Melt these together, over a slow fire, mixing with them a little powder of alkanet root, to color it. Keep stirring till cold, and then add a few drops of the oil of rhodium.

(2.) Take oil of almonds, spermaceti, white wax, and white sugar candy, equal parts. These form a good white lip salve.

Compound Cosmetic Oil.—Take oil of sweet almonds 4 ounces; oil of tartar per diliquium, 2 ounces; oil of rhodium 4 drops; mix the whole together, and use it to cleanse and soften the skin.

An Excellent Recipe.—Take a pint of cream, infuse into it a few water lilies, bean flowers, and roses. Simmer the whole together in a vapor bath, and keep the oil that

proceeds from it in a phial, which is to be left for some time exposed to the evening dew.

Sultana Unguent, for Preserving and Beautifying the Skin.—Take a ¼ of a fluid ounce, each, of tincture of tolu; tincture of benzola, and tincture of balsam of Peru, and gradually mix with them a ¼ of a pint of distilled elder water, when a milky emulsive fluid will be the result. Then have, ready melted in a basin, ½ an ounce of virgin wax and spermaceti, together with a ¼ of a pound of almond oil—this is best done by placing the ingredients in a basin set on to a small saucepan of boiling water, thus to melt the materials by steam. Finally, the tincture and water mixture is to be gradually poured into the basin of oil, sperm, &c., beating the mixture rapidly with a fork, so as to insure perfect blending of all the ingredients. When finished, the unguent assumes a beautiful snow-white creamy consistency, which finally sets when quite cold. To whiten the hands, rub them over with the sultana unguent on going to bed, and sleep in an old pair of kid gloves. To prevent wrinkles and preserve the skin, apply the unguent at night, washing it off in the morning with cold cream soap. There is scarcely a wound, bruise, or skin-blotch but what it may be applied to with "safety and with succor."

Certain Cure for Eruptions, Pimples, &c.—Having in numberless instances seen the good effects of the following prescription, I can certify to its perfect remedy: Dilute corrosive sublimate with the oil of almonds, apply it to the face occasionally, and in a few days a cure will be effected

To Whiten the Hands.—Stir a ¼ of a pound of Castile soap, and place it in a jar near the fire, pour over it ½ a pint of alcohol; when the soap is dissolved and mixed with the spirit, add 1 ounce of glycerine, the same of oil of almonds, with a few drops of essence of violets, or otto of roses, then pour it into molds to cool for use.

Pimpular Diseases, Black Spots, Flesh Worms, etc.—These specks, when they exist in any number, are a cause of much unsightliness. They are minute corks, if

we may use the term, of coagulated lymph, which close the orifices of some of the pores or exhalent vessels of the skin. On the skin immediately adjacent to them being pressed with the finger nails, these bits of coagulated lymph will come from it in a vermicular form. They are vulgarly called "flesh worms," many persons fancying them to be living creatures. These may be got rid of and prevented from returning, by washing with tepid water by proper friction with a towel, and by the application of a little cold cream. The longer these little piles are permitted to remain in the skin the more firmly they become fixed; and after a time, when they lose their moisture they are converted into long bony spines as dense as bristles, and having much of that character. They are known by the name of spotted achne. With regard to local treatment, the following lotions are calculated to be serviceable: 1. Distilled rose-water, 1 pint; sulphate of zinc, 20 to 60 grains. Mix.

2. Sulphate of copper, 20 grains; rose-water, 4 ounces; water, 12 ounces. Mix.

3 Oil of sweet almonds, 1 ounce; fluid potash, 1 drachm. Shake well together, and then add rose-water, 1 ounce; pure water, 6 ounces. Mix. The mode of using these remedies is to rub the pimples for some minutes with a rough towel, and then dab them with the lotion.

Hudson's Cold Cream.—Oil of almonds, 2 ounces; white wax, and spermacti, 1 drachm each; melt, and while warm, add rose-water, 2 ounces, and orange flower water, ½ ounce.

To Cure Freckles.—Take 2 ounces of lemon-juice; ½ drachm of powdered borax, and 1 drachm of sugar. Mix together, and let them stand in a glass bottle for a few days, then rub it on the hands and face occasionally.

Milk of Roses.—Bitter almonds, 6 drachms; sweet almonds, 12 drachms; blanch, dry, and beat up with 1 drachm of castile soap; gradually adding 15 grains of spermaceti; 30 grains of white wax, and 1 drachm of oil of almonds; melted together. When thoroughly in-

corporated, add gradually 6 drops of otto of roses, dissolved in 6 ounces of proof spirit, and 14 ounces of distilled water.

2. A common kind is made by mixing 1 ounce of fine olive oil with 10 drops of oil of tartar, and a pint of rose-water.

Milk of Cucumbers.—As milk of roses, No. 1, substituting juice of cucumbers for the rose-water.

Freckle Lotion.—Muriate of ammonia, 1 drachm; spring water, 1 pint; lavender-water, 2 drachms ; apply with a sponge 2 or 3 times a day.

Pate Divine de Venus.—Mix equal parts of washed lard, fresh butter, and white honey; add balsam of Mecca and otto of roses to perfume.

Pomade en Creme.—Melt together 1 drachm each of white wax and spermaceti, and add oil of sweet almonds, 2 ounces; pour it into a warm mortar, and gradually stir in ounce of rose or other perfumed water, and 1 drachm of tincture of tolu.

Camphor Balls, for rubbing on the hands to prevent chaps, &c. Melt 3 drachms of spermaceti, 4 drachms of white wax, and 1 ounce of almond oil ; stir in 3 drachms of powdered camphor. Pour the compound into small gallipots, so as to form small hemispherical cakes. They may be colored with alkanet, if preferred.

2. Lard, 2 ounces; white wax, 2 ounces; camphor, ½ ounce.

Camphor Ice.—Melt 1 drachm of spermaceti with 1 ounce of almond oil, and add 1 drachm of powdered camphor.

Grape Lip Salve.—Put into an earthen pipkin ½ pound of fresh butter, ¼ pound of fine yellow wax, 1 ounce of alkanet, and 3 bunches of black grapes ; boil together, and strain without pressure, through linen.

French Lip Salve.—Lard, 16 ounces; white wax, 2 ounces; nitre and alum in fine powder, each ½ ounce; alkanet to color.

German Lip Salve.—Butter of cocoa, ½ ounce; oil of almonds, ¼ ounce; melt together with a gentle heat, and add 6 drops of essence of lemon.

FACE PAINTS.

Fine Carmine (prepared from cochineal) is used alone, or deduced with starch, &c. And also the coloring matter of safflower, and other vegetable colors, in the from of pink saucers, &c.

Rouge.—Mix vermilion with enough gum tragacanth dissolved in water, to form a thin paste; add a few drops of almond oil, place the mixture in rouge pots, and dry by a very gentle heat.

Turkish Rouge.—Take ½ pint of alcohol, and 1 ounce of alkanet; macerate 10 days, and pour off the liquid, which should be bottled. This is the simplest and one of the best articles of the kind.

Almond Bloom.—Boil 1 ounce of Brazil dust in 3 pints distilled water, and strain; add 6 drachms of isinglass, 2 drachms of cochineal, 1 ounce of alum, and 8 drachms of borax ; boil again, and strain through a fine cloth.

Face Whites.—French chalk is one of the most innocent; finely powdered. White starch is also used.

Face Powder.—Starch, 1 pound; oxide of bismuth, 4 ounces.

Caution.—White lead, and all cosmetic powders containing it, should never be applied to the skin, as it is the most dangerous article that could be used.

COMMON AND FANCY SOAPS.

Genuine Erasive Soap.—2 pounds of good Castile soap ; ½ pound of carbonate of potash ; dissolved in ½ pint hot water. Cut the soap in thin slices, boil the soap with the potash until it is thick enough to mould in cakes ; also, add alcohol, ½ ounce ; camphor, ½ ounce ; hartshorn, ½ ounce ; color with ½ ounce pulverized charcoal.

To Make Good Soap.—To make matchless soap, take 1 gallon of soft soap, to which add 1 gill of common salt, and boil an hour. When cold, separate the ley from the crude. Add to the crude 2 pounds of sal soda, and boil in 2 gallons soft water till dissolved. If you wish it

better, slice 2 pounds of common bar soap, and dissolve in the above. If the soft soap makes more than 3 pounds of crude, add in proportion to the sal soda and water.

Labor-saving Soap.—Take 2 pounds of sal soda, 2 pounds of yellow bar soap, and 10 quarts of water. Cut the soap in thin slices, and boil together two hours; strain, and it will be fit for use. Put the clothes in soak the night before you wash, and to every pail of water in which you boil them, add a pound of soap. They will need no rubbing; merely rinse them out, and they will be perfectly clean and white.

Chemical Soap, for Taking Oil, Greese, etc., from Cloth.—Take 5 pounds Castile soap, cut fine; 1 pint alcohol; 1 pint soft water; 2 ounces aqua fortis; 1½ ounce lamp-back; 2 ounces saltpetre; 3 ounces potash; 1 ounce camphor, and 4 ounces cinnamon, in powder. First dissolve the soap, potash, and saltpetre, by boiling; then add all the other articles, and continue to stir until it cools; then pour into a box and let it stand twenty-four hours and cut into cakes.

To make Hard Soap from Soft.—Take 7 lbs. good soft soap; 4 lbs. sal soda; 2 ounces borax; 1 ounce hartshorn; ½ lb. rosin, to be dissolved in 22 quarts of water, and boiled about twenty minutes.

Soap from Yolk of Egg.—M. Manny, a pharmacien, of Valence, in Dauphiny, has introduced into commerce, with considerable success, a soap made from yolk of egg, which is spoken highly of, its price being the only objection to its general use. There have been already 10,000 kilogrammes disposed of. This soap is of a yellow color and firm consistence, having an odor by no means disagreeable. It dissolves readily in any water, and cleans as well as the best Marseilles soap.

Cosmetic Soap, for Washing the Hands.—Take a pound of Castile soap, or any other nice old soap; scrape it fine; put it on the fire with a little water; stir it to a smooth paste; turn it into a bowl; when cold, add some lavender water, or any kind of essence; beat it with a silver spoon till well mixed; thicken it with Indian meal, and

keep it in small pots, closely covered; exposure to the air will harden it.

Cold Soap.—Mix 26 pounds of melted and strained grease with 4 pailfuls of ley, made of 20 pounds of white potash. Let the whole stand in the sun, stirring it frequently. In the course of the week, fill the barrel with weak ley.

Bayberry, or Myrtle Soap.—Dissolve 2¼ pounds of white potash in 5 quarts of water, then mix it with 10 pounds of myrtle wax, or bayberry tallow. Boil the whole over a a slow fire till it turns to soap, then add a teacup of cold water; let it boil ten minutes longer; at the end of that time, turn it into tin moulds or pans, and let them remain a week or ten days to dry; then turn them out of the moulds. If you wish to have the soap scented, stir into it an essential oil that has an agreeable smell, just before you turn it into the moulds. This kind of soap is excellent for shaving, and for chapped hands; it is also good for eruptions on the face. It will be fit for use in the course of three or four weeks after it is made, but it is better for being kept ten or twelve months.

Whale-Oil Soap.—For the destruction of insects: Render common lye caustic, by boiling it at full strength on quicklime; then take the lye and boil it with as much whale oil foot as it will saponify (change to soap), pour off into molds, and, when cold, it is tolerably hard. Whale oil foot is the sediment produced in refining whale oil, and is worth $2 per barrel.

Lemon Wash Balls.—Cut 6 pounds of soap into very small pieces; melt it with a pint of water in which 6 lemons have been boiled. When melted, withdraw the soap from the fire, and add 3 pounds of powdered starch, and a little essence of lemon. Knead the whole into a paste, and form into balls of the desired size.

Cream Wash Balls.—White curd soap, 7 pounds; powdered starch, 1 pound; water or rose water sufficient to mix. Beat the whole together, and form into balls.

Camphor Wash Balls.—White soap, 1 pound; sperma-

ceti, 1 ounce ; water sufficient to mix; melt together, and add 1 ounce of powdered camphor.

Shaving Paste.—Melt together 1 drachm each of spermaceti, white wax, and almond oil ; beat it up with 2 ounces of the best white soap, and add a little lavender or cologne water.

Shaving Liquid.—White soap, 3 ounces; proof spirit, 8 ounces; distilled water, 4 ounces; carbonate of potash, 1 drachm; scented with essence of lemon. Dissolve the soap without heat, and add the potash and essence.

2. White soft soap, 16 ounces ; oil of olives, ½ ounce; gum benzoin, 1 drachm ; rectified spirit, 24 ounces. Digest. Rub a few drops on the beard, followed by warm water.

The Famous Chemical Washing Recipe.—Take a ¼ of a pound of soap, a ¼ of a pound of soda, and a ¼ of a pound of quicklime. Cut up the soap, and dissolve it in 1 quart of boiling water ; pour 1 quart of boiling water over the soda, and 3 quarts of boiling water upon the quicklime. The lime must be quick and fresh ; if it is good, it will bubble up on pouring the hot water upon it. Each must be prepared in separate vessels. The lime must settle so as to leave the water on top perfectly clear ; then strain it carefully (not disturbing the settlings) into the wash-boiler with the soda and soap; let it scald long enough to dissolve the soap ; then add 6 gallons of soap water. The clothes must be put in soak over night, after rubbing soap upon the dirtiest parts of them. After having the above in readiness, wring out the clothes which have been put in soak, put them on to boil, and let each lot boil half an hour ; the same water will answer for the whole washing. After boiling each lot half an hour, drain them from the boiling water, put them in a tub, and pour upon them two or three pailfuls of clear, hot water ; after this they will want but very little rubbing; then rinse them through two waters, bluing the last. When dried, they will be a beautiful white. After washing the cleanest part of the white clothes, take 2

pails of the suds in which they have been washed, put it over the fire and scald, and this will wash all the flannels and colored clothes, without any extra soap. The white flannels, after being well washed in the suds, will require to be scalded by turning on a teakettle of boiling water.

To Preserve Grease.—Boil all the scraps, rinds, and bones, in a weak ley, and the purer grease in clear water. Let the mixture cool, take off the cake of grease, and strain it. It is well to do this occasionally, as you save it; for when kept a long time, impure grease becomes offensive. You must be careful to dry off all the water before laying it away in your grease tub, if you wish it to keep sweet.

Hard White Soap.—To 15 pounds of lard, or suet, made boiling hot, add slowly 6 gallons of hot ley, or solution of potash, that will bear up an egg high enough to leave a piece big as a shilling, bare. Take out a little, and cool it. If no grease rise, it is done. If any grease appears, add ley, and boil till no grease rises. Add 3 quarts of fine salt, and boil up again. If this does not harden well on cooling, add more salt. If it is to be perfumed, melt it next day, add the perfume and run it in moulds, or cut in cakes.

To Make Lye.—Have a large tub, or cask, and bore a hole on one side, for a tap, near the bottom; place several bricks near the hole, and cover them with straw Fill the barrel with strong wood ashes. Oak ashes are strongest; and those of apple-tree wood make the whitest soap. Pour on boiling water until it begins to run, then put in the tap and let it soak. If the ashes settle down as they are wet, fill in until full.

White Lye.—This is made by pouring a pailful of boiling water over 4 or 5 quarts of ashes. Let it stand a while to infuse; then pour in cold water to settle it, when you can pour it off clear. This is very good to boil dirty clothes in. When made nice, is equal to soda, and does not, unless made extremely strong, injure the clothes.

MEDICAL HERBS, ROOTS, &c.

We are not among those who believe that herbs will cure everything, and are to be preferred to a physician's aid, but we think for all *simple* complaints, a preparation of barks or herbs, is to be preferred to more powerful remedies, as they are more harmless, and do not injure the system, as too much of the other prescriptions sometimes do.

The list we give below will be found to embrace the most important ones. For the manufacture of BITTERS, a selection may be made from the list, and boiled down to a syrup with sugar. A little rum may be added to preserve.

Sassafras.—It is an aromatic or pleasant tonic. Sassafras, prickly ash, dogwood, and American gentian, make as powerful and as pleasant a bitter as the foreign gentian, colombo, Peruvian bark, cloves, and cinnamon, that we buy at the drug store.

Mandrake, or May Apple.—Needs no description. It is an excellent purgative, in doses from ten to thirty grains, or double that quantity, in a gill of water, or equal quantities of the mandrake juice and molasses may be mixed, and a tablespoonful taken every hour or two till it operates. The Indians gather the root in autumn, when the leaves turn yellow, dry it in the shade, and pulverize it for use.

Wintergreen.—It is useful in spasmodic asthma, in urinary, and in female weaknesses. It relieves cramp from wind in the stomach, and the juice boiled with sweet oil, wax and turpentine, makes a salve, which is used to heal wounds.

Comfrey.—Boiled in milk, is excellent in the dysentry, bowel complaints, immoderate courses, and other diseases. It is beneficial in all cases attended with burning heat in urinary evacuations. A poultice of the pounded root is good for wounds and inflammatory swellings.

Tansy—Relieves hysterical affections. A wine-glass

ful of tansy juice will throw off an ague fit, if taken a few minutes before the attack.

Wild Turnip.—Its virtues are destroyed by drying, and by too much pounding. To use it as a medicine it should be scraped, and mixed with something oily, sweet, and mucilaginous. It is useful to old people, in cases of asthma, coughs, &c. It is good for women who are not regular, and a decoction of the root is used for eye-water.

Rhubarb Root.—It is generally cultivated in our gardens for the sake of the stalks, which are made into excellent pies ; the root, however, is of great efficacy in some diseases. Six to ten grains are astringent and strengthening to the stomach. In larger doses, from a scruple to half a drachm, it is first purgative, and then astringent. It is, therefore, an excellent medicine for diarrhœa and dysentery, because it evacuates any acrid matter that may be offending the bowels, before it acts as an astringent.

Dysentery.—In diseases of this kind, the Indians use the roots and leaves of the blackberry bush—a decoction of which in hot water, well boiled down, is taken in doses of a gill before each meal, and before retiring to bed. It is an almost infallible cure.

Burdock.—Operates gently on the bowels, sweetens the blood, promotes sweat and urine, and is used in rheumatic, scorbutic, and venereal diseases. Dose of the juice, a wineglassful ; of the decoction, half a pint three times a day.

Fever-few, Feather-few—Is an aromatic tonic. A decoction of the herbs, in hysterics and other female complaints, may be used to advantage.

Chamomile.—A warm decoction of the flowers in large quantities will act as an emetic ; in small doses, taken cold, it is an excellent tonic to strengthen the stomach.

Blue Flag.—Grows by the brink of rivers, in swamps, and meadows ; blossoms in July, blue flowers, variegated with white, yellow, and purple. A teaspoonful of the juice, diluted with water, is an active cathartic, and

the decoction for constant drink is used in venereal complaints.

Oak of Jerusalem or Wormseed.—This is a vermifuge or anthelmintic medicine, that is good to destroy worms. A tablespoonful of the juice of the plant expressed or squeezed out is a dose. The seed may be boiled in milk ; give a wineglassful. Or one or two teaspoonfuls of the seed itself may be mixed with molasses or honey, and given to a child two or three years old, on an empty stomach, twice a day and continued several days.

Ladies' Slipper.—Is well known. A decotion of the root is a febrifuge (a remedy for fever), and a fine regulating medicine in female complaints.

American Senna.—Grows well in this country, is very easily raised from the seeds, and ought to be cultivated in every garden. It is well known as a physic for children ; a handful of the leaves to a pint of hot water, and a teacupful or less every hour or two. till it operates.

Charcoal of Wood.—In fifteen or sixteen cases of obstinate constipation of the bowels, Dr. Daniel, of Georgia, administered three tablespoonfuls of pulverized charcoal every half hour, and in about seventeen hours the bowels were freely evacuated. It is slow, but sure. A tablespoonful two or three times a day will remove costiveness. In smaller doses it corrects bad breath, and prevents putrid belching of wind from the stomach. It is a powerful antiseptic, or anti-mortification remedy.

Sweet Fern.—Grows in woods and stony places, flowers from June to October, and is well known. It is a powerful medicine to expel the tapeworm, in the dose of a pint a day of the decotion, or one or two teaspoonfuls of the powder ; to be followed on the fifth day by a dose of some kind of physic. It is also good in chronic rheumatism, and a wash of it is considered beneficial in St. Anthony's fire, and other cutaneous affections.

Horse-Radish.—This is an anti-scorbutic and stimulating medicine. It may be taken either in substance or infused in wine, for the scurvy, dropsy, palsy, chronic

rheumatism, &c. An infusion of horse-radish in milk is the best cosmetic for the ladies, and, steeped in vinegar, it removes freckles from the face.

Blackberry.—The berry, when ripe, is known to be pleasant and wholesome, and two handfuls of the root, in three pints of milk or water, boiled down to a quart, in the dose of a tea-cupful every two or three hours, has often cured diarrhœa and dysentery, when the apothecary's medicine has failed.

Dandelion.—A decoction of dandelion will correct an unhealthy state of the stomach and liver, and procure an appetite. It is diuretic, and very beneficial in jaundice. Given in the form of extract, in from three to five-grain doses, three times a day, and continued for a long time, has the happiest effect upon the liver when its disease has assumed a chronic form. The best way of preparing it, is to gather the roots in August and September, press out the juice, and evaporate in shallow dishes exposed to a dry, warm air.

Gold Thread.—The root chewed is good for canker, or other sore mouth ; and prepared by decoction, as a gargle in sore throat. The tea is useful in cases of general debility, and loss of appetite.

Wild Cherry—The Bark and Fruit—The bark of the tree and kernels of the cherry contain a great deal of Prussic Acid, to which their medicinal virtues are to be attributed. The bark is a very powerful antiseptic, and is very useful in the preparation of dentifrice. It is also useful in Diarrhœa, Jaundice, and for worms. Generally taken in infusion, an ounce of the powder to a quart of boiling water. The Cherries also are used in medicine, and may be employed with, or without peach kernels. They are useful as a tonic and a remedy for indigestion, and particularly as a restorative for convalescents from Dysentery. Made in a syrup ; or bruised, and given in decoction.

Witch Hazel.—A tea of the leaves and bark is useful to wash putrid sores ; and it will remove that diseased or dead substance known as "Proud Flesh." For this

purpose a poultice should be made of a strong infusion; applied to the sore, or it may be washed gently with the tea.

Red Raspberry.—This also is an astringent. A tea made of the leaves is an excellent remedy for the bowel complaints of children. A little of the Bark of Slippery Elm improves its efficacy. It should also be given in the form of an injection. The tea is used as a wash and gargle; and if drank freely it has a good effect in a cankerous state of the mouth, throat, and stomach.

Yellow Dock Root.—This is one of the most valuable remedies known in disease of the Skin. The best preparation is to bruise the fresh roots in a mortar, and add cream, or fresh butter, enough to make an ointment; and it may also be taken internally at the same time, either in decoction or combined, with such articles as are useful for the internal treatment of bad humors, and scrofulous conditions of the system. It is a certain and safe remedy for the troublesome disease known as the Itch.

Golden Seal Root.—This is an admirable remedy in case of dyspepsia. A half teaspoonful of the powder, with a half teacupful of boiling water, taken immediately after eating, when the food distresses one, often gives relief. It is an article in the "Spiced Bitters."

Balmony Herb.—This is a tonic and laxative, and is employed to good advantage in Jaundice, Dyspepsia, Diseases of the Liver, Loss of Appetite, and General Debility. It enters into the composition of "Spiced Bitters."

Elder.—An infusion of Elder-flowers is good for feverishness and sore mouth in children. Add a pint of boiling water to a tablespoonful of the flowers.

The inner bark with cream, fresh butter, or sweet oil, makes a nice cooling ointment for burns, and other inflamed sores.

American Poplar Bark.—A tea made of the bark is very useful in cases of debility, especially those of long standing, and also for feeble digestion, worms, and a

diseased condition of the urinary organs. Consumptive people have received great benefit from its employment. It is an ingredient in the "Spiced Bitters" of Botanical physicians.

POPULAR BEVERAGES.

Sarsaparilla Mead.—1 pound of Spanish sarsaparilla; boil 5 hours, so as to strain off 2 gallons; add 16 pounds of sugar, and 10 ounces of tartaric acid. Half a wine-glass of syrup to half pint tumbler of water, and one half teaspoonful of soda powder, is a fair proportion for a drink.

Delicious Saline Draughts.—Take 20 grains of carbonate of soda, and an equal quantity of white sugar, 25 grains of either lemon or tartaric acid; mix this in 2 glasses of water, as usual. If you substitute half a lemon for the acid, it will be a still more delicious draught and very refreshing in hot weather, or when feverish.

Ginger Wine.—Boil together for half an hour, 7 quarts of water, 6 pounds of sugar, 2 ounces of the best ginger, bruised, and the rinds of three good-sized lemons. When lukewarm put the whole into a cask, with the juice of the lemons, and $\frac{1}{4}$ of a pound of sun raisins; add 1 teaspoonful of new yeast, and stir the wine every day for ten days.

Cheap Ginger Beer.—Put into any vessel 1 gallon of boiling water, 1 pound of common loaf sugar, 1 ounce of cream of tartar, or else a lemon sliced. Stir them up until the sugar is dissolved, let it rest until about as warm as new milk, then add 1 tablespoonful of good yeast, poured on to a bit of bread put to float on it. Cover the whole over with a cloth, and suffer it to remain undisturbed twenty-four hours, then strain it, and put it into bottles, observing not to put more in them than will occupy three-quarters of their capacity, or, as we usually say, three-quarters full. Cork the bottles well, and tie the corks, and in two days, in warm weather, it will be fit to drink. If not to be consumed till a week

or a fortnight after it is made, a quarter of the sugar may be spared. The above quantity of ingredients will make eighteen bottles, and cost tenpence.

Cider Champagne.—Good cider, 20 gallons; spirit, 1 gallon; honey or sugar, 6 pounds. Mix, and let them rest for a fortnight; then fine with skimmed milk, 1 quart. This, put up in champagne bottles, silvered, and labeled, has often been sold for champagne. It opens very sparkling.

Currant Wine.—To 1 quart juice, 2 quarts water, 3 pounds brown sugar. Ferment in tubs. Skim every day till it has done singing ; then put it in a barrel ; put the bung in losely till it has done singing ; then drive it in tight, and it will be ready to bottle in January.

What to do with Summer Fruit.—Much Summer fruit is very transient, decaying even before it falls from the tree, and some times even before it is ripe. This is true of many pears. Picked, or shaken from the tree and picked over, they make excellent *perry*, which is like cider, but more delicate and wine-like. It needs a cool cellar to undergo its fermentation in. Apples should be made into cider. Sweet, it brings a high price in market, and is a delightful cooling beverage, but does not make so good cider as later, when fermentation is less rapid. The small hand-mills and presses are very good for pressing fruits, and a family may supply itself with the juices for preservation, and considerable quantities for sale.

Lemon Syrup.—Take 1 pound of Havana sugar, boil it in water down to a quart, drop in the white of an egg, and strain it. Add $\frac{1}{4}$ of an ounce of tartaric acid ; let it stand two days ; shake it often. 4 drops of oil of lemon will much improve it.

Sherbet.—Boil in 3 pints of water 6 or 8 stalks of green rhubarb, and 4 ounces of raisins or figs ; when the water has boiled about half an hour, strain it, and mix it with a teaspoonful of rose water, and orange or lemon syrup to the taste. Drink it cold.

Quick Ginger Beer.—To a pail of water add 2 ounces

of ginger, 1 pint of molasses, and a gill of good yeast. In two hours it is fit for use.

Spruce Beer.—Boil 1 handful of hops, and 2 of the chips of sassafras root, in 10 gallons of water; strain it, and turn on, while hot, a gallon of molasses, 2 spoonfuls of the essence of spruce, 2 spoonfuls of ginger, and 1 of pounded allspice. Put it into a cask; and when cold enough, add half a pint of good yeast; stir it well; stop it close; when clear, bottle and cork it.

Ginger Beer.—Turn 2 gallons of boiling water on 2 pounds of brown sugar or to a quart of molasses, add 1½ ounces of cream of tartar, and the same of ginger; stir them well, and put it into a cask. When milkwarm, put in half a pint of good yeast, stopping the cask close, and shaking it well. Bottle it in about twenty-four hours. In ten days it will sparkle like champagne. One or two lemons sliced in, will much improve it. It is excellent in warm weather.

Lemonade Powders.—Pound and mix together ½ pound of loaf sugar, 1 ounce of carbonate of soda, and 3 drops of oil of lemon. Divide the mixture into sixteen portions, wrapped in white paper. Then take 1 ounce of tartaric acid, and divide into sixteen portions, wrapping them up in blue paper. Dissolve one of each kind in half a tumbler of water, mix the two solutions together and drink while effervescing.

Elderberry Wine.—Take elderberry juice, 10 gallons; water, 10; white sugar, 45 pounds; red tartar, 8 ounces. These are put into a cask, a little yeast added, and the whole is fermented. When undergoing fermentation, ginger root, 4 ounces; allspice 4, and cloves 1 ounce, are put into a bag of clean cotton cloth, and suspended in the cask. They give a pleasant flavor to the wine, which will become clear in about two months, and may be drawn off and bottled. Some add brandy to this wine, but if the fermentation is properly conducted, this is not necessary.

2. Take 5 gallons of elderberries and boil them for half an hour in the same quantity of water, adding ½ an

ounce of cloves, 2 of ginger, and 2 of cinnamon. T e whole are strained through a clean cotton cloth or a hair sieve, and considerable pressure is used to obtain all the juice. This is now put into a cask, 15 pounds of brown sugar stirred in, and the whole fermented. It takes from two to three months before fermentation is completed and the wine ready to be bottled. The flavor of this wine is very similar to that obtained from the grapes of Oporto, in Portugal.

Blackberry Wine.—The following is said to be an excellent recipe for the manufacture of a superior wine from blackberries :—Measure your berries, and bruise them ; to every gallon adding 1 quart of boiling water. Let the mixture stand twenty-four hours, stirring occasionally ; then strain off the liquor into a cask, to every gallon adding 2 pounds of sugar ; cork tight, and let stand till the following October, and you will have wine ready for use, without any further straining or boiling, that will make lips smack, as they never smacked under similar influence before.

Tomato Wine.—Take ripe, fresh tomatoes, mash very fine, strain through a fine sieve, sweeten with good sugar to suit the taste, set it away in an earthen or glass vessel, nearly full, cover tight, with the exception of a small hole for the refuse to work off through during its fermentation. When it is done fermenting, it will become pure and clear. Then bottle, and cork tight. A little salt improves its flavor ; age improves it.

Hop Beer.—Turn 5 quarts of water on 6 ounces of hops ; boil three hours ; strain off the liquor ; turn on 4 quarts more of water, and 12 spoonfuls of ginger, and boil the hops three hours longer ; strain and mix it with the other liquor, and stir in 2 quarts of molasses. Brown, very dry, half a pound of bread, and put in—rusked bread is best. Pound it fine, and brown it in a pot, like coffee. After cooling to be about lukewarm, add a pint of new yeast that is free from salt. Keep the beer covered, in a temperate situation, till fermentation has ceased, which is known by the settling of the

froth; then turn it into a keg or bottles, and keep it in a cool place.

Lemon Beer.—To a gallon of water add a sliced lemon, a spoonful of ginger, ½ a pint of yeast, and sugar enough to make it quite sweet.

Cream Nectar.—Tartaric acid, 1 ounce; cream of tartar, 1 ounce; white sugar, 1¼ pounds; water, 1 pint; the whites of two eggs, well beaten; one tablespoonful of wheat flour. Put all the above articles in a tin dish, and heat it—but not to the boiling point—and then add a drop of good oil of lemon, or any other flavor you choose, and then you have the syrup.

Directions for Using.—Take a glass two-thirds full of water, add 3 tablespoonfuls of the syrup, and as much soda as you can place on a dime. This makes a cool and refreshing drink in hot weather.

To Preserve Cider.—The following recipe for preserving cider was tested last fall by a friend, and found to be all that is claimed for it: When the cider in the barrel is in a lively fermentation, add as much white sugar as will be equal to a ¼ or ¾ of a pound to each gallon of cider (according as the apples are sweet or sour), let the fermentation proceed until the liquid has the taste to suit, then add ¼ of an ounce of sulphite (not sulphate) of lime to each gallon of cider, shake well, and let it stand three days, and bottle for use. The sulphite should first be dissolved in a quart or so of cider before introducing it into the barrel of cider.

Tamarinds, or Cranberry Juice, with double the quantity of water, forms a pleasant drink for invalids when approaching convalescence.

Blackberry Wine.—Having procurred berries that are fully ripe, put them into a tub or pan with a tap to it, and pour upon them as much boiling water as will just cover them. As soon as the heat will permit the hand to be put into the vessel, bruise them well till all the berries are broken. Then let them stand covered till the berries begin to rise toward the top, which they usually do in three or four days. Then draw off the clear liquor into another vessel, and add to every 10

quarts of this liquor 4 pounds of sugar; stir it well, and let it stand to work a week or ten days; then filter it through a flannel jelly bag into a cask. Take now 4 ounces of isinglass and lay it to steep for twelve hours in a pint of blackberry juice; the next morning boil it over a slow fire for half an hour with a quart or 3 pints more juice, and pour it into the cask; when cool, rouse it about well and leave it to settle for a few days, then rack it off into a clean cask, and bung it down.

Delicious Milk Lemonade.—Pour a pint of boiling water on 6 ounces of loaf sugar, add $\frac{1}{4}$ of a pint of lemon juice, and half the quantity of good sherry wine. Then add $\frac{3}{4}$ of a pint of cold milk, and strain the whole, to make it clear.

Royal Strawberry Acid.—Take 3 pounds of ripe strawberries, 2 ounces of citric acid, and 1 quart of spring water. Dissolve the acid in the water, and pour it on the strawberries, and let them stand in a cool place 24 hours. Then drain the liquid off, and pour it on 3 more pounds of fruit; let it stand 24 hours. Add to the liquid its own weight of sugar; boil it 3 or 4 minutes in a porcelain-lined preserve kettle, lest metal may affect the taste, and, when cool, cork it in bottles lightly for 3 days, then tightly, and seal them. Keep in a dry and cool place. It is delicious for the sick or well.

Portable Lemonade.—Mix strained lemon juice with loaf sugar, in the proportion of 4 large lemons to a pound, or as much as it will hold in solution; grate the rind of the lemons into this, and preserve the mixture in a jar. If this is too sweet, add a little citric acid. Use a tablespoonful to a tumbler of water.

Orange, or Lemon Syrup.—Put $1\frac{1}{2}$ pounds of white sugar to each pint of juice; add some of the peel; boil 10 minutes; then strain and cork it. It makes a fine beverage, and is useful to flavor pies, &c.

Acid Fruit Syrups.—The juice of any acid fruit can be made into a syrup by the above recipe, using only a pound of sugar for each pint of juice, and kept on hand for summer drink.

Imitation Lemon Syrup.—Four ounces of tartaric acid,

powdered; 2 drachms of oil of lemon. This can be kept in a vial for a month, and then must be renewed. A tablespoonful, put into water sweetened with white sugar, makes six glasses of lemonade.

Superior Ginger Beer.—Ten pounds of sugar; 9 ounces of lemon juice ; ½ a pound of honey ; 11 ounces of bruised ginger root ; 9 gallons of water ; 3 pints of yeast. Boil the ginger half an hour in a gallon of water; then add the rest of the water and the other ingredients, and strain it when cold. Add the white of an egg beaten, and ½ an ounce of essence of lemon. Let it stand 4 days, then bottle, and it will keep many months.

Lemon Sherbet.—Dissolve 1½ pounds of loaf sugar in 1 quart of water; add the juice of 10 lemons; press the lemons so as to extract both the juice and the oil of the rind, and let the peel remain awhile in the water and sugar. Strain through a sieve, and freeze like ice cream.

Orange Sherbet.—Take the juice of 1 dozen oranges, and pour 1 pint of boiling water on the peel, and let it stand, covered, half an hour. Boil 1 pound of loaf sugar in 1 pint of water, skim, and then add the juice and the water from the peel to the sugar. Strain and cool, or freeze it. The juice of 2, and a little more sugar, improves it.

Sham Champagne.—Take 1 lemon, sliced; 1 tablespoonful of tartaric acid ; 1 ounce of race ginger ; 1½ pounds of sugar ; 2½ gallons of boiling water poured on the above. When blood warm, add 1 gill of distillery yeast, or 2 gills of home-brewed. Let it stand in the sun through the day. When cold, in the evening, bottle, cork, and wire it. In two days it is ready for use.

Strawberry Vinegar.—Put 4 pounds of very ripe strawberries, nicely dressed, into 3 quarts of the best vinegar, and let them stand 3 or 4 days ; then drain the vinegar through a jelly-bag, and pour it on the same quantity of fruit. Repeat the process in the days for a third time. Finally, to each pound of the liquor thus obtained, add 1 pound of fine sugar. Bottle, and let it stand covered, but not tightly corked, 1 week ; then cork it tight, and

set it in a cool, *dry* place, where it will not freeze. Rasp berry vinegar is made the same way.

Simple Wine Whey.—Mix equal parts of water, milk, and white wine. Warm the milk and water, and then add the wine. Sweeten it to the taste.

Ginger Beer Powders, and Soda Powders.—Put into blue papers, 30 grains to each paper, of bicarbonate of soda, 5 grains of powdered ginger, and 1 drachm of white powdered sugar. Put into white papers, 25 grains, to each, of powdered tartaric acid. Put 1 paper of a kind to ½ a pint of water. The common soda powders of the shops are like the above, with the sugar and ginger omitted. Soda powders can be kept on hand, and the water in which they are used can be flavored with any kind of syrup or tincture, and thus make a fine drink for hot weather.

Currant Ice Water.—Press the juice from ripe currants, strain it, and put a pound of sugar to each pint of juice. Put it into bottles, cork and seal it, and keep it in a cool, dry place. When wanted, mix it with ice water for a drink ; or put water with it, make it *very* sweet, and freeze it. Freezing takes away much of the sweetness. The juices of other acid fruits may be used in the same way.

Effervescing Fruit Drinks.—Very fine drinks are prepared by putting strawberries, raspberries, or blackberries, into good vinegar, and then drawing it off, and adding a new supply of fruit, till enough flavor is secured. Keep the vinegar bottled, and in hot weather use it thus : Dissolve ½ a teaspoonful, or less, of salæratus, or soda, in a tumbler (very little water), till the lumps are all out. Then fill the tumbler two-thirds full of water, and add the fruit vinegar. If several persons are to drink, put the fruit vinegar into each tumbler, and dissolve the soda in a pitcher, and pour into the tumblers as each person is ready to drink ; delay spoils it.

Effervescing Jelly Drinks.—When jams, or jellies, are too old for table use, mix them with good vinegar, and then use them with soda, or salæratus, as directed above.

Summer Beverage.—Ten drops of oil of sassafras ; 10 drops of oil of spruce ; 10 drops of oil of wintergreen ; 2 quarts of boiling water, poured on 2 great spoonsful of cream of tartar. Add 8 quarts of cold water, the oils, 3 gills of distillery yeast (or 6 of home-brewed), and sweeten it to the taste. In 24 h ours, bottle it, and it is a delicious beverage.

CANDIES.

To Clarify Sugar for Candies.—To every pound of sugar, put a large cup of water, and put it in a brass or copper kettle, over a slow fire, for half an hour ; pour into it a small quantity of isinglass and gum Arabic, dissolved together. This will cause all impurities to rise to the surface ; skim it as it rises. Flavor according to taste.

All kinds of sugar for candy, are boiled as above directed. When boiling loaf sugar, add a tablespoonful of rum or vinegar, to prevent its becoming too brittle whilst making.

Loaf sugar when boiled, by pulling and making into small rolls, and twisting a little, will make what is called little rock, or snow. By pulling loaf sugar after it is boiled, you can make it as white as snow.

Ginger Candy.—Boil a pint of clarified sugar until, upon taking out a drop of it on a piece of stick, it will become brittle when cold. Mix, and stir up with it, for a common article, about a teaspoonful of ground ginger; if for a superior article, instead of the ground ginger, add half the white of an egg, beaten up previously with fine sifted loaf sugar, and 20 drops of strong essence of ginger.

Another.—Take coarsely-powdered ginger, 2 ounces; boiling water, $1\frac{1}{4}$ pints ; macerate in a warm place for 3 hours, strain, and add 7 pounds each of loaf and brown sugar.

Ginger Drops.—Are the same, except that they are made with all loaf sugar.

Ginger Lozenges.—Dissolve in $\frac{1}{4}$ of a pint of hot water $\frac{1}{2}$ ounce of gum arabic ; when cold, stir it up with $1\frac{1}{2}$ pounds of loaf sugar, and a spoonful of powdered ginger or 12 drops of essence of ginger. Roll and beat the whole up into a paste ; make it into a flat cake, and punch out the lozenges with a round stamp ; dry them near the fire, or in an oven.

Common Twist Candy.—Boil 3 pounds of common sugar and one pint of water over a slow fire for half an hour, without skimming. When boiled enough take it off; rub the hands over with butter ; take that which is a little cooled, and pull, it as you would molasses candy, until it is white ; then twist or braid it, and cut it up in strips.

Fine Peppermint Lozenges. — Best powdered white sugar, 7 pounds ; pure starch, 1 pound ; oil of peppermint to flavor. Mix with mucilage.

Everton Taffee.—To make this favorite and wholesome candy, take $1\frac{1}{2}$ pounds of moist sugar, 3 ounces of butter, a teacup and half of water, and one lemon. Boil the sugar, butter, water, and half the rind of the lemon together, and when done —which will be known by dropping into cold water, when it should be quite crisp —let it stand aside till the boiling has ceased, and then stir in the juice of the lemon. Butter a dish, and pour it in about a quarter of an inch in thickness. The fire must be quick, and the taffee stirred all the time.

Candy Fruit.—Take 1 pound of the best loaf sugar ; dip each lump into a bowl of water, and put the sugar into your preserving kettle. Boil it down and skim it until perfectly clear, and in a candying state. When sufficiently boiled, have ready the fruits you wish to preserve. Large white grapes, oranges separated into small pieces, or preserved fruits, taken out of their syrup and dried, are very nice. Dip the fruits into the prepared sugar while it is hot ; put them in a cold place ; they will soon become hard.

Lozenges that will Cure the Heartburn.—Take prepared chalk, 4 ounces; crabs' eyes, prepared, 2 ounces; bole am-

moniac, 1 ounce ; make it into a paste with dissolved gum Arabic. When held in the mouth till they dissolve, they will afford sensible relief.

Common Lemon Candy.—Take 3 pounds of coarse, brown sugar; add to it 3 teacupfuls of water, and set it over a slow fire for half an hour ; put to it a little gum Arabic, dissolved in hot water ; this is to clear it. Continue to take off the scum as long as any rises. When perfectly clear, try it by dipping a pipe-stem first into it, and then into cold water, or by taking a spoonful of it into a saucer ; if it is done, it will snap like glass. Flavor with essence of lemon, and cut it in sticks.

Peppermint, Rose, or Hoarhound Candy.—They may be made as lemon candy. Flavor with essence of rose, or peppermint, or finely powdered hoarhound. Pour it out in a buttered paper, placed in a square tin pan.

Popped Corn.—Dipped in boiling molasses and stuck together forms an excellent candy.

Molasses Candy.—Boil molasses over a moderately hot fire, stirring constantly. When you think it is done, drop a little on a plate, and if sufficiently boiled it will be hard. Add a small quantity of vinegar to render it brittle and any flavoring ingredient you prefer. Pour in buttered tin pans. If nuts are to be added strew them in the pans before pouring out the candy.

Liquorice Lozenges.—Extract of liquorice 1 pound, powdered white sugar, 2 pounds. Mix with mucilage made with rose-water.

Fig Candy.—Take 1 pound of sugar and 1 pint of water, set over a slow fire. When done, add a few drops of vinegar and a lump of butter, and pour into pans in which split figs are laid.

Raisin Candy.—Can be made in the same manner, substituting stoned raisins for the figs. Common molasses candy is very nice with all kinds of nuts added.

Scotch Butter Candy.—Take 1 pound of sugar, 1 pint of water ; dissolve and boil. When done add 1 tablespoonful of butter, and enough lemon juice and oil of lemon to flavor.

Icing for Cakes.—Beat the whites of two small eggs to a high froth; then add to them a quarter of a pound of white, ground or powdered, sugar; beat it well until it will lie in a heap; flavor with lemon or rose. This will frost the top of a common-sized cake. Heap what you suppose to be sufficient in the centre of the cake, then dip a broad-bladed knife in cold water, and spread the ice evenly over the whole surface.

Saffron Lozenges.—Finely powdered hay-saffron, 1 ounce; finely powdered sugar, 1 pound; finely powdered starch, 8 ounces. Mucilage to mix.

Chocolate Cream.—Chocolate, scraped fine, ½ ounce; thick cream, 1 pint; sugar (best), 3 ounces; heat it nearly to boiling, then remove it from the fire, and mill it well. When cold add the whites of four or five eggs; whisk rapidly and take up the froth on a sieve; serve the cream in glasses, and pile up the froth on the top of them.

Candied Lemon or Peppermint, for Colds. Boil—1½ pounds of sugar in a half pint of water, till it begins to candy round the sides; put in 8 drops of essence; pour it upon buttered paper, and cut it with a knife.

REMEDIES FOR VERMIN.

To Destroy Rats.—Fill any deep smooth vessel of considerable capacity, to within six inches of the top, with water, cover the surface with bran, and set the vessel in a place most frequented by these pests. In attempting to get at the bran, they will fall in and be drowned. Several dozen have been taken by this simple method at a time.

To Drive away Mice.—Gather any kind of mint and scatter it about your shelves, and they will forsake the premises.

To Destroy Caterpillars.—Boil together a quantity of rue, wormwood, and any cheap tobacco (equal parts), in common water. The liquid should be very strong

Sprinkle it on the leaves and young branches every morning and evening during the time the fruit is ripening.

To clear a House of Vermin.—Common green paint, in powder, sold under the name of French green, will clear a house completly of roaches and vermin of every description. So infallible is this remedy that men offer to clear houses by contract, at large prices, on the principle of "no cure, no pay," and they never fail to succeed. Six cents worth is all that is required, and money can be easily and surely made by ridding houses of these pests.

To Kill Lice on Stock of all Kinds—Take 1 ounce of *coculus indicus*, which should be bought of any druggist at from twelve to fifteen cents per pound, and steep it in one gallon of water, and apply it as is recommended for tobacco extract. It will be found quite as effectual, and much more pleasant to use. I have used it with unvarying success for killing lice on canary birds. Dip them in, keeping the head out. and soak well. It is perfectly safe.

Phosphorus Paste for the Destruction of Rats and Mice.—Take of phosphorus, 8 parts, liquify it in 180 parts of luke-warm water, pour the whole into a mortar, and add immediately 180 parts of rye meal; when cold, mix in 180 parts of butter melted, and 125 parts of sugar. If the phosphorus is in a finely-divided state, the ingredients may be all mixed at once, without melting them. This mixture will retain its efficacy for many years, for the phosphorous is preserved by the butter, and only becomes oxydized on the surface. Rats and mice eat this mixture with avidity, after which they swell out and soon die. This recipe was directed to be used in place of arsenic by the Prussian Government.

Remedy against Moths.—An ounce of gum camphor and one of the powdered shell of red pepper are macerated in 8 ounces of strong alcohol for several days, then strained. With this tincture the furs or cloths are sprinkled over, and rolled up in sheets. Instead of the

pepper, bittler apple may be used. This remedy is used in Russia under the name of the Chinese tincture for moths.

To Protect Dried Fruit from Worms.—It is said that dried fruit put away with a little sassafras bark (say a large handful to a bushel), will save for years, unmolested by those troublesome little insects which so often destroy hundreds of bushels in a season. The remedy is cheap and simple.

To Keep Away Mosquitos.—Dip a piece of sponge or flannel in camphorated spirits, and make fast to the top of the bedstead.

Death to Rats and Mice.—The following is an excellent recipe for the destruction of rats and mice: Mix some fine plaster of Paris with an equal quantity of flour; put the mixture in the place infested by the vermin, and a vessel full of water beside it. The rats will devour the mixture, and then drink; whereupon the plaster, brought into contact with the water, will become solid, and like a stone in their stomachs, which will cause their death. This method is evidently highly preferable to the use of arsenic, which is always attended with danger.

Rat Poison.—Flour, 6 pounds; sugar, 1 pound; sulphur, 4 pounds; phosphorus, 4 pounds.

To Destroy Rats.—When a house is infested by rats which refuse to nibble at toasted cheese, and the usual baits, a few drops of the highly scented oil of rhodium, poured on the bottom of a cage top, will always attract it full of the "mischievous rodents" before morning. We have known this to be tried with most extraordinary success. Where a trap baited with all manner of edibles had failed to attract a single rat, the oil of Rhodium caused it to be comvletely crowded night after night.

To Destroy Cockroaches.—The following is said to be effectual: These vermin are easily destroyed, simply by cutting up green cucumbers at night, and placing them about where roaches commit depredations. What is

cut from the cucumbers in preparing them for tne table answers the purpose as well, and three applications will destroy all the roaches in the house. Remove the peelings in the morning, and renew them at night.

To Kill Rats in Barn and Rick.—Melt hog's lard in a bottle plunged in water of temperature of 150 degrees Fahrenheit; introduce into it ½ an ounce of phosphorus for every pound of lard, then add a pint of proof spirits or whiskey; cork the bottle firmly after its contents have been to 150 degrees, taking it out of the water and agitating till the phosphorus becomes uniformly diffused, making a milky-looking fluid. The spirit may be poured off on the liquor cooling; and you have then a fatty compound, which, after being warmed gently, may be incorporated with a mixture of wheat flour, or sugar, flavored with oil of rhodium, or oil of anise-seed, &c., and the dough, on being made into pellets, should be laid at the rat-holes; being luminous in the dark, and agreeable both to the palates and noses, it is readily eaten, and proves certainly fatal. The rats issue from their holes and seek for water to quench their burning thirst, and they commonly die near the water.

To Kill Bed-bugs.—An effectual lime for the destruction of bed-bugs may be made as follows: Two ounces of red arsenic, a ¼ of a pound of white soap, ½ an ounce of camphor dissolved in a teaspoonful of spirits rectified, made into a paste of the consistency of cream. Place this mixture in the openings and cracks of the bedstead.

RECEIPTS FOR INKS.

Cheap Black Ink.—Extract of logwood, 2 ounces; sulphate of potash, ¼ of an ounce; boiling water, 1 gallon. Mix. This is an excellent ink, and can be made at a cost not exceeding fifteen cents a gallon.

Indestructible Ink.—On many occasions, it is of importance to employ an ink indestructible by any process, that will not equally destroy the material on which it is

applied. For black ink, 25 grains of copal, in powder, are to be dissolved in 200 grains of oil of lavender by the assistance of a gentle heat, and are then to be mixed with 2½ grains of lampblack, and half a grain of indigo. This ink is particularly useful for labeling phials, &c., containing chemical substances of a corrosive nature.

Blue Ink Easily Made.—The soluble indigo of commerce makes a good blue ink when slightly diluted with hot water. It is incorrosive for steel pens, and flows freely.

A Quart of Ink for a Dime.—Buy extract of logwood, which may be had for three cents an ounce, or cheaper by the quantity. Buy also, for three cents, an ounce of *bi-chromate of potash.* Do not make a mistake, and get the simple chromate of potash. The former is orange red, and the latter clear yellow. Now, take ½ an ounce of extract of logwood and 10 grains of bi-chromate of potash, and dissolve them in a quart of hot rain water. When cold, pour it into a glass bottle, and leave it uncorked for a week or two. Exposure to the air is indispensable. The ink is then made, and has cost five to ten minutes' labor, and about three cents, besides the bottle. The ink is at first an intense steel blue, but becomes quite black.

Ink for Marking Linen with Type.—Dissolve one part of asphaltum in four parts of oil of turpentine, and lampblack or blacklead in fine powder, in sufficient quantity to render of proper consistency to print with type.

Indelible Marking Ink.—1½ drachms of nitrate of silver, 1 ounce of distilled water, ½ ounce of strong mucilage of gum Arabic, ¾ of a drachm of liquid ammonia. Mix the above in a clean glass bottle, cork tightly, and keep in a dark place till dissolved, and ever afterwards. Directions for use: Shake the bottle, then dip a clean quill pen in the ink, and write or draw what you require on the article; immediately hold it close to the fire (without scorching), or pass a hot iron over it, and it

will become a deep and indelible black, indestructible by either time or acids of any description.

Ink Powder for Immediate Use.—Reduce to powder 10 ounces of gall-nuts, 3 ounces of green copperas, 2 ounces each of powdered alum and gum Arabic. Put a little of this mixture into white wine, and it will be fit for immediate use.

For Indelible Ink.—To 4 drachms of lunar caustic, in 4 ounces of water, add 60 drops of nutgalls, made strong by being pulverized and steeped in soft water. The mordant which is to be applied to the cloth before writing, is composed of 1 ounce of pearlash dissolved in 4 ounces of water, with a litttle gum Arabic dissolved in it. Wet the spot with this ; dry and iron the cloth ; then write.

2. Nitrate of silver, 5 scruples ; gum Arabic, 2 drachms; sap green, 1 scruple; distilled water, 1 ounce. Mix together. Before writing on the article to be marked, apply a little of the following : carbonate of soda, ½ ounce ; distilled water, 4 ounces; let this last, which is the mordant, get dry ; then, with a quill pen, write what you require.

First Rate Black Ink.—Take 12 pounds of bruised galls, 5 pounds of gum Senegal, 5 pounds of green sulphate of iron, and 12 gallons of rain water. Boil the galls with 9 gallons of water for three hours, adding fresh water to replace what is lost by evaporation. Let the decoction settle, and draw off the clear liquor ; add to it a strained solution of the gum; dissolve also the sulphate of iron separately, and mix the whole.

Another.—Galls, 3 pounds., sulphate of iron, 1 pound ; logwood, ½ pound ; gum, ½ pound ; ale, 4 gallons. Let it stand in loosely-corked bottles, in a warm place, for a week or two, shaking it daily.

Runge's Black Writing Fluid.—Boil 22 pounds of logwood in enough water to yield 14 gallons of decoction. To each 1,000 parts add one part of yellow chromate of potash. Stir the mixture.

Transfer Ink.—Mastic in tears, 4 ounces ; shellac, 6

ounces; Venice turpentine, ½ ounce; melt together; add wax, ½ pound ; tallow, 3 ounces. When dissolved, further add hard tallow soap (in shavings), 3 ounces; and when the whole is combined, add lampblack, 2 ounces. Mix well, cool a little, and then pour it into molds. This ink is rubbed down with a little water in a cup or saucer, in the same way as water-color cakes. In winter, the operation should be performed near the fire.

Copying Ink.—Dissolve ½ ounce of gum, and 20 grains of Spanish licorice, in 13 drachms of water, and add 1 drachm of lamp-black, previously mixed with a teaspoonful of sherry.

Another.—Common black ink, 3 parts ; sugar candy, 1 part.

Lamp-black.—Real lamp-black, produced by combustion of linseed-oil, ground with gum and infusion of galls. It is prepared both in a liquid and a solid form, the latter being dried in the sun.

To Make Carmine.—Boil 1 pound 4 ounces of ground cochineal, and a very little of the carbonate of soda in 4 gallons of soft water for 20 minutes ; then take it from the fire, and add 6 drachms of alum, and stir the mixture for a few minutes, and let it stand for a quarter of an hour for the dregs to subside ; then run off the clear liquor ; strain the sediment through a fine sieve or cloth, and then, when cold, add the white of two eggs with the sediment ; fish glue or isinglass will answer as well as the eggs. The muriate of tin may be used instead of alum. The weight of the cochineal may be reduced to any amount to make a small quantity if the proportions are preserved.

An excellent Substitute for Ink.—Put a couple of iron nails into a teaspoonful of vinegar. In half an hour pour in a tablespoonful of strong tea, and then you will have ink enough for a while.

Red Ink.—Take of the raspings of Brazil wood, ¼ pound, and infuse them two or three days in colorless vinegar. Boil the infusion one hour and a half over a gentle fire, and afterward filter it while hot, through pa

per laid in an earthenware cullender. Put it again over the fire, and dissolve in it first half an ounce of gum arabic, and afterward of alum and white sugar, each half an ounce. Care should be taken that the Brazil wood be not adulterated with the Braziletto or Campeachy wood.

Blue Ink.—Chinese blue, 3 ounces, oxalic acid (pure), $\frac{3}{4}$ of an ounce ; gum arabic, powdered ; 1 ounce, distilled water ; 6 pints. Mix.

Durable Ink for Marking Linen.—Dissolve 2 drachms of lunar caustic, and half an ounce of gum arabic, in a gill of rain water. Dip whatever is to be marked in strong pearlash water. When perfectly dry, iron it very smooth ; the pearlash water turns it a dark color, but washing will efface it. After marking the linen, put it near a fire, or in the sun, to dry. Red ink, for marking linen, is made by mixing and reducing to a fine powder half an ounce of vermilion, a drachm of the salt of steel, and linseed-oil to render it of the consistency of black, durable ink.

Inkstains.—The moment the ink is spilled, take a little milk, and saturate the stain, soak it up with a rag, and apply a little more milk, rubbing it well in. In a few minutes the ink will be completely removed.

To Remove the Marks of India Ink on the Flesh.—Blister the part with a plaster a little larger than the mark ; then keep the place open with an ointment for a week ; finally, dress it to get well. As the new skin grows, the tattoo will disappear.

Printer's Ink.—10 or 12 gallons of nut-oil or linseed-oil are set over the fire in a large iron pot, and brought to boil. It is then stirred with an iron ladle, and while boiling, the inflammable vapor arising from it either takes fire of itself, or is kindled, and is suffered to burn in this way for about half an hour, the pot being partially covered so as to regulate the body of the flame, and, consequently, the heat is communicated to the oil. It is frequently stirred during this time, that the whole may be heated equally ; otherwise a part would be charred, and the rest left imperfect. The flame is then extin-

guished by covering the pot entirely. The oil, by this process, has much of its unctuous quality destroyed, and, when cold, is of the consistence of soft turpentine; it is then called varnish. After this, it is made into ink, by mixture with the requisite quantity of lampb-lack; of which about $2\frac{1}{2}$ ounces are sufficient for 16 ounces of the prepared oil. The oil loses by the boiling about $\frac{1}{8}$ of its weight, and emits very offensive fumes. During the boiling, add by degrees 3 ounces of turpentine soap, and 2 ounces of black resin to every pound of oil. Besides these additions, others are made by the printers, of which the most important is a little fine indigo in powder, to improve the beauty of the color; excellent printing ink. Balsam of copaiba (or Canada balsam) nine ounces; lamp-black, three ounces; Indigo and Prussian blue, of each 5 drachms; Indian red, $\frac{3}{4}$ of an ounce; yellow soap (dry), 3 ounces. Grind it to an impalpable smoothness. Mix with old linseed-oil.

Resin-oil Ink.—Melt together 13 ounces of resin, 1 pound of resin oil, and $1\frac{1}{2}$ ounce of soft soap; when cold, add lamp-black.

Cheap Printing Ink.—Take equal parts of lamp-black and oil; mix and keep on the fire, till reduced to the right consistency. This is a good ink for common purposes, and is very cheap. We have used it extensively ourselves.

Sympathetic or Secret Inks—Mix equal quantities of sulphate of copper and sal ammoniac, and dissolve in water. Writing done with this ink is invisible until the paper is heated, when it turns a yellow color. Lemon juice, milk, juice of onions, and some other liquids, become black when the writing is held to the fire.

RECEIPTS FOR MANUFACTURERS.

The following receipts embrace a variety of articles which are used in every family, and which have a universal demand. By the manufacture of these pre-

parations a handsome profit may be realized. They are easily disposed of, either to dealers or consumers. We do not think it necessary to give any directions for putting up the articles, as the form and style are familiar to almost everyone, and it would be only wasting space to do so here. Thousands of persons are making handsome incomes by the manufacture of these articles at the present time, and there is room for thousands more, all over the country :

White Cement for Crockery, Glass, &c.—Take 4 pounds of white glue, $1\frac{1}{2}$ pounds of dry white lead, half a pound of isinglass, 1 gallon of soft water, 1 quart of alcohol, and half a pint of white varnish. Dissolve the glue and isinglass in the water by gentle heat if preferred, stir in the lead, put the alcohol in the varnish, and mix the whole together.

Cement for Broken China.—Stir plaster of Paris into a thick solution of gum arabic, till it becomes a viscous paste. Apply it with a brush to the fractured edges, and draw the parts closely together.

A Cement for Attaching Metal to Glass.—Take 2 ounces of a thick solution of glue, and mix it with 1 ounce of linseed-oil varnish, and half an ounce of pure turpentine; the whole are then boiled together in a close vessel. The two bodies should be clamped and held together for about two days after they are united, to allow the cement to become dry. The clamps may then be removed.

Marine Glue.—Dissolve 4 parts of india-rubber in 34 parts of coal tar naphtha—aiding the solution with heat and agitation. The solution is then thick as cream, and it should be added to 64 parts of powdered shellac, which must be heated in the mixture till all is dissolved. While the mixture is hot it is poured on plates of metal, in sheets like leather. It can be kept in that state, and when it is required to be used, it is put into a pot and heated till it is soft, and then applied with a brush to the surfaces to be joined. Two pieces of wood joined with this cement can scarcely be sundered.

Cement for Mending Steam Boilers.—Mix two parts of finely powdered litharge with one part of very fine sand, and one part of quicklime which has been allowed to slack spontaneously by exposure to the air. This mixture may be kept for any length of time without injury. In using it a portion is mixed into paste with linseed-oil, or still better, boiled linseed-oil. In this state it must be quickly applied as it soon becomes hard.

Japanese Cement.—Intimately mix the best powdered rice with a little cold water, then gradually add boiling water until a proper consistence is acquired, being particularly careful to keep it well stirred all the time; lastly, it must be boiled for one minute in a clean saucepan or earthen pipkin. This glue is beautifully white and almost transparent, for which reason it is well adapted for fancy paper work, which requires a strong and colorless cement.

Diamond Cement.—Isinglass, 1 ounce; distilled vine-vinegar, 5½ ounces; spirits of wine, 2 ounces; gum ammoniacum, half an ounce; gum mastic, half an ounce. Mix well.

Glue for Ready Use.—To any quantity of glue use common whiskey instead of water. Put both together in a bottle, cork tight, and set it away for three or four days, when it will be fit for use without the application of heat.

Liquid Glue.—Dissolve one part of powdered alum, one hundred and twenty parts of water; add one hundred and twenty parts of glue, ten of acetic acid, and forty of alcohol, and digest. Prepared glue is made by dissolving common glue in warm water, and then adding acetic acid (strong vinegar) to keep it. Dissolve 1 pound of best glue in 1½ pint of water, and add 1 pint of vinegar. It is ready for use.

Indian Glues.—Take 1 pound of the best glue, the stronger the better, boil it and strain it very clear; boil also 4 ounces of isinglass, put the mixture into a double glue pot, add half a pound of brown sugar, and boil the whole until it gets thick; then pour it into thin plates

or molds, and when cold you may cut and dry them in small pieces for the pocket. The glue is used by merely holding it over steam, or wetting it with the mouth. This is a most useful and convenient article, being much stronger than common glue. It is sold under the name of Indian glue, but is much less expensive in making, and is applicable to all kinds of small fractures, etc.; answers well on the hardest woods, and cements china, etc., though, of course, it will not resist the action of hot water. For parchment and paper, in lieu of gum or paste, it will be found equally convenient.

Cement for Aquaria.—Many persons have attempted to make aquarium, but have failed on account of the extreme difficulty in making the tank resist the action of water for any length of time. Below is a recipe for a cement that can be relied upon ; it is perfectly free from any thing that injure the animal,or plants; it sticks to glass, metal, wood, stone, &c., and hardens under water. A hundred different experiments with cements, have been tried, but there is nothing like it. It is the same as that used in constructing the tanks of the Zoological Gardens, London, and is almost unknown in this country. One part, by measure, say a gill of litharge; 1 gill of plaster of Paris ; 1 gill of dry, white sand ; ⅓ of a gill of finely-powdered rosin. Sift and keep corked tight until required for use, when it is to be made into a putty by mixing in boiled oil (linseed) with a little patent dryer added. Never use it after it has been mixed (that is, with the oil) over fifteen hours. This cement can be used for marine as well as fresh water aquaria, as it resists the action of salt water. The tank can be used immediateiy, but it is best to give it three or four hours to dry.

Waterproof Composition for Boots and Shoes.—Melt 3 ounces of bees-wax, and the same of resin ; then add 1 pint of boiled oil. Stir well together. Let it boil up; remove from the fire, and add three ounces of the oil of turpentine.

Blacking for Harness.—Melt four ounces of mutton

suet with twelve ounces of bees-wax ; add twelve ounces of sugar-candy, four ounces of soft soap, dissolved in water, and two ounces of indigo finely powdered. When melted and well mixed, add half a pint of turpentine. Lay it on the harness with a sponge, and polish off with a brush.

Blacking for Morocco Shoes.—Pound some black sealing wax, and put in a bottle with half a pint of alcohol ; shake it frequently, and when it is dissolved, you may rub it on morocco shoes when they are scaled or defaced, and they will look almost like new ; dry it on in the sun.

Liquid Blacking.—Mix a quarter of a pound of ivory black, 6 gills of vinegar, a table-spoonful of sweet oil, and two large spoonsful of molasses. Stir the whole well together, and it will then be fit for use.

Carriage Harness Blacking.—Take three sticks of black sealing wax, dissolve them in half a pint of alcohol, and then apply with a sponge. Lac dissolved in alcohol, and colored with lamp-black, will answer the same purpose. This is a quick drying, hard varnish, liable to crack the leather, and should, therefore, be put on as seldom as possible.

Unsurpassable Blacking.—Put 1 gallon of vinegar into a stone jug, and 1 pound of ivory-black well pulverized, a half pound of loaf sugar, a half ounce of oil of vitriol and 7 ounces of sweet oil; incorporate the whole by stirring.

Take 12 ounces each of ivory black and treacle ; spermaceti oil, 4 ounces ; and white wine vinegar, 2 quarts. Mix thoroughly. This contains no vitriol, and therefore will not injure the leather. The trouble of making it is very little, and it would be well to prepare it for one's self, were it only to be assured that it is not injurious.

Black Ball.—Melt together, moderately, 10 ounces of bayberry tallow, 5 ounces of bees-wax, and 1 ounce of mutton tallow. When melted, add lamp or ivory black to give it a good black color. Stir the whole well together, and add, when taken from the fire, half a glass of rum.

Caoutchouc Shoe Blacking.—18 ounces of caoutchouc are to be dissolved in about 9 pounds of hot rape oil. To this solution 60 pounds of fine ivory black and forty-five pounds of molasses are to be added, along with 1 pound of finely-powdered gum arabic, previously dissolved in 20 gallons of vinegar. These mixed ingredients are to be finely triturated in a paint-mill, till the mixture becomes perfectly smooth. To this varnish twelve pounds of sulphuric acid are to be now added, in small successive quantities, with powerful stirring for half an hour ; at the end of which time, three pounds of finely-ground gum arabic are added ; after which the stirring is repeated half an hour, for fourteen days longer, when the *liquid* blacking is ready for use. In making the *paste* blacking, the patentees prescribe the above quantity of India-rubber oil, ivory black, molasses, and gum arabic—the latter being dissolved in only 12 pounds of vinegar. These ingredients are to be well mixed and then ground together in a mill, till they form a perfectly smooth paste. To this paste 12 pounds of sulphuric acid are to be added in small quantities at a time, with powerful stirring, which is to be continued half an hour after the last portion of the acid has been introduced. Ready for use in seven days.

Gold and Silver Coin Detector.—10 grains of nitrate of silver, and 1 ounce of water.

Bluing for Clothes.—Take 1 ounce of soft Prussian blue, powder it and put in a bottle with 1 quart of clear rain water, and add 1 quarter ounce of oxalic acid. A teaspoonful is sufficient for a large washing.

Liquid Blue.—Take half a pound of best double oil of vitriol, mix one ounce of Spanish indigo, pounded very fine, and scrape in a little chalk ; have an iron pot half full of sand, set this on the fire ; when the stand is hot, put the bottle in, and let the vitriol, &c., boil gently for a quarter of an hour ; take the whole off the fire, and le it stand for twenty-four hours, and then bottle it for use.

Furniture Oil for Polishing and Staining Mahogany.—Take of linseed-oil, 1 gallon; alkanet root, 3 ounces; rose pink, 1 oz. Boil them together ten minutes, and strain so that the oil be quite clear. The furniture should be well rubbed with it every day until the polish is brought up, which will be more durable than any other.

Furniture Polish.—Bees-wax half a pound, and a quarter of an ounce of alkanet root; melt together in a pipkin until the former is well colored. Then add linseed-oil, and spirits of turpentine, of each half a gill; strain through a piece of coarse muslin.

Colored Chalks or Crayons.—Take three quarters of a pound of blue clay, three quarters of a pound of the coloring required, such as vermilion, chrome, Prussian blue, orpiment, &c., 2 ounces of turpentine, 4 ounces of spirits of wine, and 6 ounces of fine shellac. The clay must be well mixed with water, passed through a fine lawn sieve, and allowed to subside; the water is then poured off and the clay dried. The shellac must be dissolved in the mixed turpentine and spirit with a little warmth. The dry clay and the coloring, must be blended in a mortar, and then the shellac mixture added and well incorporated till the whole is a doughy mass; it is then to be rolled out into a pencil form and dried with stove heat. To make the crayons of uniform substance, the paste may be placed in a cylinder, with a hole at one end and a piston at the other (like a boy's popgun), the "wormy" pieces that pass through are then cut into proper lengths and dried.

Grafting Wax.—Five parts of resin; one part of bees-wax; one part of tallow. Melt these in a skillet, tin cup, or any metal vessel: the skillet being preferable, as it can be handled better, and the wax keeps warm longer in it. Melt these over the fire and mix together well. When the scions are set—say as many as twenty or thirty, or as few as is wished—have the mixture ready and apply it warm, with a small wooden paddle. See that every part is covered and the air completely excluded. It requires no bandage.

Composition for House-Roofs.—Take one measure of fine sand, two of sifted wood-ashes, and three of lime, ground up with oil. Mix thoroughly, and lay on with a painter's brush, first a thin coat, and then a thick one. This composition is not only cheap, but it strongly resists fire.

Red Bottle Wax.—Common resin 4 pounds; tallow 1 pound; red lead 1 pound. Mix with heat. Any coloring matter may be substituted, if other colors are wanted.

Starch Polish.—Take common dry potato or wheat starch sufficient to make a pint of starch when boiled. Then add half a drachm of spermaceti, and half a drachm of white wax, and then use it as common starch, only using the iron as hot as possible. In this mancer a brilliant polish is produced.

Substitute for Court Plaster.—Take half a dozen pigs' feet, well cleaned for cooking, and boil to a jelly of say about half a pint or less—then spread with a brush on any waste scraps of silk, and we find it equal to any adhesive plaster we have ever used. Any fatty substance in the boiling of the feet raises to the surface, and when cold can easily be removed. One of its chief excellencies is, that it costs nothing but the trouble of preparing.

Celebrated Recipe for Silver Wash.—1 ounce of nitric acid, 1 ten cent piece, and 1 ounce of quicksilver. Put in an open glass vessel, and let it stand until dissolved; then add one pint of water, and it is ready for use. Make it into a powder by adding whiting, and it may be used on brass, copper, German silver, &c.

Approved Friction Matches.—About the best known preparation for friction matches consists of gum arabic, 16 parts by weight; phosphorus, 9 parts; nitre, 14 parts; peroxyd of manganese, in powder, 16 parts. The gum is first made into a mucilage with water, then the manganese, then the phosphorus, and the whole is heated to about 130 deg. Fah. When the phosphorus is melted the nitre is added, and the whole is thoroughly stirred

until the mass is a uniform paste. The wooden matches prepared first with sulphur, are then dipped in this and afterward dried in the air. Friction papers, for carrying in the pocket, may be made in the same manner, and by adding some gum benzoin to the mucilage they will have an agreeable odor when ignited.

Tracing Paper.—In order to prepare a beautiful transparent, colorless paper, it is best to emply the varnish formed with Demarara resin in the following way: The sheets intended for this purpose are laid flat on each other, and the varnish spread over the uppermost sheet by means of a brush, until the paper appears perfectly colorless, without, however, the liquid therein being visible. The first sheet is then removed, hung up for drying, and the second treated in the same manner. After being dried, this paper is capable of being written on, either with chalk, or pencil, or steel pens. It preserves its colorless transparency without becoming yellow, as is frequently the case with that prepared in any other way.

French Polish.—To one pint of spirits of wine, add a quarter of an ounce of gum copal, and a quarter of an ounce of gum arabic, and 1 ounce of shellac. Let the gums be well bruised, and sifted through a piece of muslin. Put the spirits and the gums together in a vessel that can be closely corked; place them near a warm stove, and frequently shake them; in two or three days they will be dissolved; strain the mixture through a piece of muslin, and keep it tightly corked for use.

Coachmaker's Varnish.—The fine black varnish of the coachmakers is said to be prepared by melting 16 ounces of amber in an iron pot, adding to it half a pint of drying linseed-oil, boiling hot, of powdered resin and asphaltum, 3 ounces each. When the materials are well united, by stirring over the fire, they are to be removed, and after cooling for some time, a pint of warm oil of turpentine is to be introduced.

Parchment.—Paper parchment may be produced by immersing paper in a concentrating solution of chloride of zinc.

Mahogany Stain.—Break 2 ounces of dragon's blood in pieces, and put them in a quart of rectified spirits of wine ; let the bottle stand in a warm place, and shake it frequently. When dissolved it is fit for use, and will render common wood an excellent imitation of mahogany.

Fire Kindlers.—Take a quart of tar and 3 pounds of resin, melt them, bring to a cooling temperature, mix with as much sawdust, with a little charcoal added, as can be worked in ; spread out while hot upon a board, when cold break up into lumps of the size of a large hickory nut, and you have, at a small expense, kindling material enough for a household for one year. They will easily ignite from a match and burn with a strong blaze, long enough to start any wood that is fit to burn.

Razor Paste.—Emery reduced to an impalpable powder, two parts ; spermaceti ointment, one part ; mix together, and rub it over the strop.

Cheap, White House-Paint.—Take skim milk 2 quarts, 8 ounces fresh slacked lime, 6 ounces linseed-oil, 2 ounces white Burgundy pitch, 3 pounds Spanish white. Slack the lime in water, expose it to the air, and mix in about ¼ of the milk ; the oil, in which the pitch is previously dissolved, to be added, a little at a time ; then the rest of the milk, and afterwards the Spanish white. This quantity is sufficient for thirty square yards, two coats, and costs but a few cents. If the other colors are wanted, use, instead of Spanish white, other coloring matter.

VALUABLE SECRETS.

Elder Ointment.—This is a very popular article in the country and is regarded as a valuable cooling and healing salve. Take fresh elder leaves, bruised, 3 pounds ; suet 4 pounds ; lard 2 pounds. Boil together until the leaves become crisp, and squeeze through a linen cloth. Elder *flower* ointment is made in the same way, using one pound of flowers and one pound of lard.

Mahogany Cement.—Melt 4 ounces of beeswax, and add 1 ounce of red lead and enough yellow ochre to produce tint required. Used to fill cracks and holes in furniture.

Polishing Powder, (for brass and copper).—Take 3 parts of rotton stone to 1 part of powdered soap. This is to be thoroughly mixed, and moistened with water when used.

Eye Water.—Toke sulphate of zinc, 20 grains; distilled water, ½ pint; dissolve. An excelent astringent lotion in chronic opthamaia, weak and irritable eyes, &c.

New Method of Embalming—Mix together 5 pounds dry sulphate of alumine, 1 quart of warm water, and 100 grains of arsenious acid. Inject 3 or 4 quarts of this mixture into all the vessels of the human body. This applies as well to all animals, birds, fishes, &c. This process supersedes the old and revolting mode, and has been introduced into the great anatomical schools of Paris.

Great Pain Extractor.—Spirits of ammonia 1 ounce, laudanum 1 ounce, oil of organum 1 ounce, mutton tallow half pound ; combine the articles with the tallow when it is nearly cool.

To Catch Foxes.—Take oil of amber and beaver's oil each equal parts, and rub them over the trap.

Bryan's Pulmonic Wafers, for Coughs, Colds, &c.—Take white sugar, 7 pounds ; tincture of syrup of ipecac, 4 ounces; antimonial wine, 2 ounces; morphine, 10 grains; dissolved in a tablespoonful of water, with 10 or 15 drops sulphuric acid ; tincture of blood root, 1 ounce; syrup of tolu, 2 ounces; add these to the sugar, and mix the whole mass as confectioners do for lozenges, and cut into lozenges the ordinary size. Use from 6 to 12 of these in 24 hours. They sell at a great profit.

Cough Syrup.—Put 1 quart hoarhound to 1 quart of water, and boil it down to a pint ; add 2 or 3 sticks of licorice and a tablespoonful of essence lemon. Take a tablespoonful of the syrup three times a day, or as often as the cough may be troublesome. The above receipt has been sold for $100. Several firms are making much money by its manufacture.

Ointment.—Take equal parts of yellow root or gold thread, and common elder bark, and simmer them in hogs' lard. No family should be without this ointment. It is good in chapped hands, chilblains, burns, and scalds, sore nipples and lips.

Bengal Lights.—Take of nitrate of potassa (saltpetre), 8 parts; sublimed sulphur 4 parts, and antimony 1 part, and let them be well mixed in powder and beat firmly into a stout iron cup, and set on fire; and if a little camphor be added it is still more brilliant. Such lights are made use of for communicating at a great distance by sea at night.

Tomato Figs.—Pour boiling water over the tomatoes, in order to remove the skins; then weigh them, and place them in a stone jar, with as much sugar as you have tomatoes, and let them stand two days; then pour off the syrup, and boil and skim it until no scum rises. Then pour it over the tomatoes, and let them stand two days, as before; then boil and skim again. After the third time, they are fit to dry, if the weather is good; if not, let them stand in the syrup until drying weather. Then place on large earthen plates or dishes, and put them in the sun to dry, which will take about a week, after which pack them d own in small wooden boxes, with fine white sugar between every layer. Tomatoes prepared in this manner will keep for years.

Soluble Glass.—Mix 10 parts of carbonate of potash, 15 parts of powdered quartz, and 1 part of charcoal. Fuse well together. The mass is soluble in 4 or 5 parts of boiling water, and the filtered solution, evaporated to dryness, yields a transparent glass permanent in the air.

French Gold.—Spanish copper 6 parts, silver 3 parts, gold 5 parts. Mix.

Bronze.—Copper 14 parts, zinc 6 parts, tin 4 parts Mix.

Gun Metal.—Copper 9 parts, tin 1 part.

Artificial Silver.—Melt 1 pound copper with ¾ ounce tin; will look and ring like sterling silver.

Armenian Cement.—The jewelers of Turkey, who are mostly Armenians, have a singular method of ornamenting watch cases, &c., with diamonds and other precious stones, by simply gluing or cementing them on. The stone is set in silver or gold, and the lower part of the metal made flat, or to correspond with the part to which it is to be fixed; it is then gently warmed and the glue is applied, which is so very strong that the parts thus cemented never separate. This glue will strongly unite pieces of glass and china, and even polished steel, and may be applied to a variety of useful purposes. The following is the receipt:

Dissolve five or six bits of gum mastic, each the size of a large pea, in as much rectified spirits of wine as will suffice to render it liquid; and, in another vessel, dissolve as much isinglass, previously a little softened in water (though none of the water must be used), in French brandy or good rum, as will make a two ounce vial of very strong glue, adding two small bits of gum galbanum or ammoniacum, which must be rubbed or ground till they are dissolved. Then mix the whole with a sufficient heat. Keep the glue in a vial closely stopped, and when it is to be used set the vial in boiling water.

Artificial Honey.—Take 10 pounds of Havana sugar, 4 pounds of water, 40 grains of cream tartar, 10 drops essence peppermint, and 3 pounds of honey; first, dissolve the sugar in the water over a slow fire, and take off the scum arising therefrom. Then dissolve the cream tartar in a little warm water, and add, with some stirring; then add the honey, heated to a boiling point; then add the essence of peppermint; stir for a few moments, and let it stand until cold, when it will be ready for use.

Hatching Fish.—The Chinese practice a peculiar method cf hatching the spawn of fish, which, perhaps, may be useful for our fish cultivators to know. They carefully collect the spawn of their fish in the streams and rivers, fill empty shells of fresh eggs with it, carefully stop up the holes in the eggs, and set them under a setting hen. At the expiration of nine days they take these shells and break them in tanks containing water warmed by

the sun. Water in these tanks is frequently renewed, and in it the young fry are gradually developed until they are sufficiently large to be placed in fish ponds The sale of spawn fish for hatching forms an important branch of trade in China.

Gunpowder.—Nitre 75 parts, charcoal 12½ parts, sulphur 12½ parts. Mix.

Cheap Galvanic Battery.—Take acylindrical vessel, and put another of porous porcelain inside of it; fillthe vessel with diluted sulphuric acid,and the space between the two with sulphate of copper (if you require to plate the article with copper); if not, a solution of the salt of gold, silver, &c., according to that which you wish it to be ; put a slip of zinc in the sulphuric acid, and attach a copper wire to it, and the other end to the medal or article you wish to plate, and immerse that in the other solution. Your battery is now complete. If you want the copper to be very thick, you must put a few solid crystals of copper in the solution ; where you do not want it to come in contact, you must touch it with a little grease; if you want to take the copper off the article you must do it over with a slight varnish.

HINTS FOR HOUSEKEEPERS.

Best Way to Dry Apples.—The most general method adopted in drying apples is, after they are pared, to cut them in slices, and spread them on cloths, tables, or boards, and dry them out-doors. In clear and dry weather this is, perhaps, the most expeditious and best way ; but in cloudy and stormy weather this way is attended with much inconvenience, and sometimes loss, in consequence of the apples rotting before they dry. To some extent they may be dried in this way in the house, though this is attended with much inconvenience. The best method that I have ever used to dry apples is to use frames. These combine the most advantages with the least inconvenience of any way, and can be used

with equal advantage either in drying in the house or out in the sun. In pleasant weather the frames can be set out-doors against the side of the building, or any other support, and nights, or cloudy and stormy days, they can be brought into the house, and set against the side of the room near the stove or fire-place. My frames are made in the following manner: Two strips of board, 7 feet long, 2 or $2\frac{1}{2}$ inches wide—two strips 3 feet long, $1\frac{1}{2}$ inches wide, the whole $\frac{3}{4}$ of an inch thick—nail the short strips across the ends of the long ones, and it makes a frame 7 by 3 feet, which is a convenient size for all purposes. On one of the long strips nails are driven 3 inches apart, extending from the top to the bottom. After the apples are pared, they are quartered and cored, and with a needle and twine, or stout thread strung into lengths long enough to reach twice across the frame; the ends of the twine are then tied together, and the strings hung on the nails across the frame. The apples will soon dry so that the strings can be doubled on the nails, and fresh ones put on or the whole of them removed, and others put in their place. As fast as the apples become sufficiently dry they can be taken from the strings, and the same strings used to dry more on. If large apples are used to dry, they can be cut in smaller pieces. Pears and quinces, and other fruits that can be strung, may be dried in this way.

To Polish Enameled Leather.—2 pints of the best cream; 1 pint of linseed oil; make them each lukewarm, and then mix them well together. Having previously cleaned the shoe from dirt, rub it over with a sponge dipped in the mixture; then rub it with a soft dry cloth until a brilliant color is produced.

To prevent Smoke from a Lamp.—Soak the wick in strong vinegar, and dry it well before you use it; it will then burn both sweet and pleasant, and give much satisfaction for the trifling trouble in preparing it.

Washing Paint.—The best method to wash paint is to rub some bath-brick fine, and when you have rubbed some soap on the flannel, dip it in the brick. This will remove the grease and dirt speedily, without injury.

Alum in Starch.—For starching muslins, ginghams, and calicoes, dissolve a piece of alum the size of a shell-bark, for every pint of starch, and add to it. By so doing, the colors will keep bright for a long time, which is very desirable when dresses must be often washed, and the cost is but a trifle.

Preservation of Milk and Cream.—Put the milk into bottles, then place them in a saucepan with cold water, and gradually raise it to the boiling point ; take it from the fire, and instantly cork the bottles, then raise the milk once more to the boiling point for half a minute. Finally let the bottles cool in the water in which they were boiled. Milk thus treated will remain perfectly good for six months. Emigrants, especially those having children, will find the above hint add much to their comfort while on their voyage.

Oiling Leather.—Oils should not be applied to dry leather, as they will invariably injure it. If you wish to oil a harness, wet it over night, cover it with a blanket, and in the morning it will be dry and supple ; then apply neat's-foot oil in small quantities, and with so much elbow grease as will insure its disseminating itself throughout the leather. A soft, pliant harness is easy to handle, and lasts longer than a neglected one. Never use vegetable oils on leather and among animal oils neat's foot is the best.

How to Know Good Flour.—When flour is genuine or of the best kind, it holds together in a mass when squeezed by the hand, and shows the impressions of the fingers, and even of the marks of the skin much longer than when it is bad or adulterated ; and the dough made with it is very gluey, ductile, and elastic, easy to be kneaded; and may be elongated, flattened, and drawn in every direction without breaking.

To Keep Milk from Turning Sour.—Add a little sub-carbonate of soda, or of potash. This by combining with, and neutralizing the acetic acid formed, has the desired effect, and keeps the milk from turning sooner than it otherwise would. The addition is perfectly harmless, and does not injure the taste.

Candles.—Prepare your wicks about half the usual size, wet with spirits of turpentine, put them into the sun until dry, then mold or dip your candles. Candles thus made last longer, and give a much clearer light. In fact they are nearly or quite equal to sperm, in clearness of light.

Preservation of Eggs.—Eggs may be preserved for any length of time by excluding them from the air. One of the cleanest and easiest methods of doing this, is to pack them in clean, dry salt, in barrels or tubs, and to place them in a cool and dry situation. An old shipmaster says, that he has eaten eggs thus preserved that were a twelvemonth old, and that had been some months aboard ship, in a tropical climate, and yet retained all the peculiar sweetness of new laid eggs. Some persons place eggs which they wish to preserve in a netting, or on a sieve or cullender, and immerse them for an instant in a cauldron of boiling water, before packing them away. Sometimes eggs are placed in vessels containing milk of lime, or strong brine, or rubbed over with butter, lard, or gum water ; all of which act by excluding the air.

Beet Root Coffee.—A very good coffee can be made of beet root in the following manner : Cut dry beet root into very small pieces, then gradually heat it in a close pan over the fire for about fifteen minutes. Now introduce a little sweet fresh butter, and bring it up to the roasting heat. The butter prevents the evaporation of the sweetness and aroma of the beet root, and when fully roasted it is taken out, ground and used like coffee. A beverage made of it is cheap, and as good for the human system as coffee of chicory.

Dried Herbs.—All herbs which are to be dried should be washed, separated, and carefully picked over, then spread on a coarse paper and keep in a room until perfectly dry. Those which are intended for cooking should be stripped from the stems and rubbed very fine. Then put them in bottles and cork tightly. Put those which are intended for medicinal purposes into paper bags, and keep them in a dry place.

To Make Yeast.—Boil 1 pound of good flour, ¼ of a pound of brown sugar, and a little salt in 2 gallons of water, for one hour. When milk-warm, bottle it and cork it close. It will be ready for use in twenty-four hours. One pint of this yeast will make 18 pounds of bread.

Cider Yeast.—Take cider from sour apples before it ferments, scald, skim thoroughly, and pour, while hot, upon flour enough to make stiff batter. When cool, add yeast of any kind, and let it rise, stirring it down as often as it tries to run over for several days, then put it in a cool place (where it will not freeze), and you will have something equal to the best hop yeast. It will keep until May without any further labor.

Substitute for Yeast.—Boil 1 pound of flour, a ¼ of a pound of brown sugar, and a little salt, in 2 gallons of water, for one hour. When milk-warm, bottle and cork close, and it will be ready for use in twenty-four hours.

Excellent Vinegar.—To 1 gallon of clear clover blossoms add 1 quart of molasses and a ½ pound of sugar; pour over these one gallon of boiling water. When cold, add ½ a pint of good yeast. If more water is needed, add as you please. It makes strong, pure vinegar.

Cowslip Vinegar.—To 4 gallons of water with the chill just taken off, and 6 pounds of brown sugar and ½ a peck of cowslips, flowers and stalks together; put all into a cask with 3 tablespoonfuls of yeast; lay a piece of glass or slate over the bunghole, and set it in a warm place till the vinegar grows sour, when the bung may be fastened down. This is a cheap and excellent vinegar, keeping pickles nice and crisp. If kept in a warm place the vinegar will be ready in six months. A quarter of an ounce of gelatine or isinglass will make it clear sooner.

Cider Vinegar.—After cider has become too sour for use, set it in a warm place, put to it occasionally the rinsings of the sugar basin or molasses jug, and any re-

mains of ale or cold tea; let it remain with the bung open, and you will soon have the best of vinegar.

To give Lustre to Silver.—Dissolve a quantity of alum in water, so as to make a pretty strong brine, and skim it carefully; then add some soap to it, and dip a linen rag in it, and rub over the silver.

To keep Preserves.—Apply the white of an egg, with a suitable brush, to a single thickness of white tissue paper, with which cover the jars, overlapping the edges an inch or two. When dry, the whole will become as tight as a drum.

To take Stains out of Linen.—Stains caused by acids can be removed by wetting the part and laying it on some salt of wormwood; then rub it without diluting it with more water.

Or, tie up in stained part some pearlash; then scrape some soap into cold soft water, to make a lather, and boil the linen till the stain disappears.

Recent stains of fruit may be removed by holding the linen tightly stretched over a tub and pouring hot water over the part. This must be done before any soap has been applied to it. As soon as the stain is made on table linen, &c., rub on it common table salt, before it has had time to dry; the salt will keep it damp till the cloth is washed, when the stain will disappear; or, wash the stain lightly when the cloth is removed.

To stop a Leak.—Yellow soap, beaten up thick, with whiting, and rubbed into the leak, has sometimes stopped it when all other things have failed.

To Clean Gold.—Powder some whiting, and make it into a moist paste with some sal volatile. Cover over the gold ornaments and surface with a soft brush, let it dry, and then brush it off with a moderately hard brush.

Measures for Housekeepers.

Wheat flour........1 lb. ....is 1 quart.	Best brown sugar. 1 lb. 2 oz is 1 quart.
Indian meal........1 " 2 oz. " 1 "	Eggs.............10 eggs are 1 lb.
Butter when soft...1 " .... " 1 "	Flour............. 8 quarts " 1 peck.
Loaf sugar, broken.1 " .. . " 1 "	Flour............. 4 pecks " 1 bush.
White sugar, powd.1 " 1 oz. " 1 "	

Liquids.

16 large tablespoonfuls, are..half a pint.	4 quarts are ....one gallon.
8 large tablespoonfuls, are..one gill.	A common sized tumbler holds half a pint.
4 large tablespoonfuls, are..half a gill.	A common sized wine-glass.. half a gill.
2 gills, are ....half a pint.	25 drops are equal to...one teaspoonful.
2 pints, are................one quart.	

Oyster Catsup.—Take fine fresh oysters, rinse them in their own liquor, then pound them in a marble mortar, and to a pint of oysters put a pint of cherry wine ; boil them up, add an ounce of salt, 2 drachms of cayenne pepper, let it boil up once again, rub it through a sieve ; when cold, put it in bottles and cork and seal them.

Batter Pudding.—Beat 4 eggs thoroughly, mix with them ½ pint of milk, and add them, by degrees, to ½ pound of flour. When the batter is perfectly smooth, thin it with another half pint of milk. Flour well a wet pudding-cloth, pour the batter in, leave it room to swell, tie it securely, and put it in plenty of fast boiling water.

Lemon Pudding.—Half a pound of sugar, ½ pound of butter, 1 lemon grated, and the juice added ; 5 eggs will make two pies.

Gingerbread Nuts.—One pound of flour ; rub into it ¼ pound of white powdered sugar, 1 ounce of grated ginger, and the peel of a lemon. Bake in a slow oven.

Jumbles.—Half a pound of sugar, ½ pound of butter, ¾ pound of flour, and 2 eggs.

Oyster Patties.—Take of oysters sufficient for the patties you may chance to want, strain the liquor and return it to them, mix them with very fine bread-crumbs until they are of a proper thickness, add a little scalded cream, and season the whole with pepper, salt, and cayenne pepper ; warm the whole in a sauce-pan till it begins to simmer ; when cold, put it in the paste, and bake it in the shape of small mince pies, three inches in diameter. The beards and horny part should be cut off, and the oysters cut into two or three pieces.

Cold Fried Chicken.—Cut the chicken in quarters, and take off the skin, rub it with an egg beaten up, and cover it with grated bread seasoned with pepper, salt, grated lemon-peel, and chopped parsley, fry it in butter, thicken a little brown gravy with flour and butter, add a little cayenne pepper, lemon pickle, and mushroom catsup.

Water-Proof Porous Cloth. — Several inquiries have been made of us, lately, respecting the mode of preparing cloth to render it water-proof, and yet maintain its porosity. Close water-proof cloth fabrics, such as glazed oil-cloth, India-rubber, and gutta-percha cloth are completely water-proof, but do not permit perspiration and the exhaled gases from the skin to pass through them, because they are air-tight as well as water-tight. Persons who wear air-tight garments soon become faint, if they are undergoing severe exercise, such as that to which soldiers are exposed when on march. A porous, water-proof cloth, therefore, is the best for outer garments during wet weather, for those whose duties or labor causes them to perspire freely. The best way for preparing such cloth is by the process adopted for the tunics of the French soldiers during the Crimean war. It is as follows: Take 2¼ pounds of alum and dissolve this in 10 gallons of boiling water; then in a separate vessel dissolve the same quantity of sugar of lead in 10 gallons of water, and mix the two solutions. The cloth is now well handled in this liquid, until every part of it is penetrated; then it is squeezed and dried in the air, or in a warm apartment, then washed in cold water and dried again, when it is fit for use. If necessary, the cloth may be dipped in the liquid and dried twice before being washed. The liquor appears curdled, when the alum and lead solutions are mixed together. This is the result of double decomposition, the sulphate of lead, which is an insoluble salt, being formed. The sulphate of lead is taken up in the pores of the cloth, and it is unaffected by rains or moisture, and yet it does not render the cloth air-tight. Such cloth is also partially non-inflammable. A solution of alum itself will render cloth, prepared as described, partially water-proof, but it is not so good as the sulphate of lead. Such cloth—cotton or woolen—sheds rain like the feathers on the back of a duck.

Magic Copying Paper.—To make black paper, lamp-black mixed with cold lard; red paper, Venetian Red mixed with lard; blue paper, Prussian Blue mixed with lard; green paper, Chrome Green mixed with lard. The

above ingredients to be mixed to the consistency of thick paste, and to be applied to the paper with a rag. Then take a flannel rag, and rub until all color ceases coming off. Cut your sheets four inches wide, and six inches long; put four sheets together, one of each color, and sell for twenty-five cents per package. The first cost will not exceed three cents.

Directions for writing with this paper; Lay down your paper upon which you wish to write; then lay on the copying paper, and over this lay any scrap of paper you choose; then take any hard pointed substance and write as you would with a pen.

Varnish for Maps, Drawings, &c.—Boil some clear parchment cuttings in water, in a glazed earthen vessel, till they produce a very clear size; strain it, and keep it till wanted; then give the work two coats of the size, passing the brush quickly over the work, so as not to disturb the colors. Or, mix 1 ounce of Canada balsam and 2 ounces of spirits of turpentine together, then size the map, or drawing, with a solution of isinglass in water, and when dry apply the varnish with a camels' hair brush.

Silver Plating Fluid.—Dissolve 1 ounce of nitrate of silver in crystal, in 12 ounces of soft water, then dissolve in the water 2 ounces cyanuret of potash, shake the whole together, and let it stand till it becomes clear. Have ready some half ounce vials, and fill half full of Paris white, or fine whiting, and then fill up the bottles with the liquor, and it is ready for use. The whiting does not increase the coating power, it only helps to clean the articles, and to save the silver fluid, by half filling he bottles.

Furniture Polish.—Take equal parts of sweet oil and vinegar, mix, add a pint of gum arabic finely powdered This will make furniture look almost as good as new and can be easily applied, as it requires no rubbing The bottle should be shaken, and the polish poured on a rag and applied to the furniture.

fuse it in an iron kettle ; then add 5 gallons of boiled linseed oil, 1 pound of litharge, ½ pound of sulphate of zinc (add these slowly or it will fume over), and boil them for about three hours. Now add 1½ pounds of dark gum amber, and boil for two hours longer, or until the mass will become quite thick when cool, after which it should be thinned with turpentine to due consistency

RECEIPTS FOR HORSES.

Cough Ball for Horses.—Pulverized ipecac, ¾ ounce ; camphor, 2 ounces; squills, ½ ounce. Mix with honey to form into mass, and divide into eight balls. Give one every morning.

Fever Ball.—Emetic tartar and camphor, each ½ ounce; nitre, 2 ounces. Mix with linseed meal and molasses to make eight balls. Gixe one twice a day.

Worm Balls.—Assafœtida, 4 ounces; gentian, 2 ounces; strong mercurial ointment, 1 ounce. Make into mass with honey. Divide into sixteen balls. Give one or more every morning.

Purgative Ball.—Aloes, 1 ounce ; cream tartar and castile soap ¼ ounce. Mix with molasses to make a ball.

Diuretic Balls.—Castile soap scraped fine, powdered rosin, each 3 teaspoonfuls ; powdered nitre, 4 teaspoonfuls ; oil of juniper, 1 small teaspoonful ; honey, a sufficient quantity to make into a ball.

Cathartic Powder.—To cleanse out horses in the spring, making them sleek and healthy. Black sulphuret of antimony, nitre, and sulphur, each equal parts Mix well together, and give a tablespoonful every morning.

Blistering Liniment.—Powdered Spanish flies, 1 ounce, spirits turpentine, 6 ounces. Rub on the belly for pain the bowels, or on the surface for internal inflammation

Liniment for Sprains, Swellings, &c.—Aqua ammonia, spirits camphor, each 2 ounces; oil origanum and laudanum, each ½ ounce. Mix.

Lotion for Mange.—Boil 2 ounces tobacco in one quart water; strain; add sulphur and soft soap, each 2 ounces.

TANNING.

The process of tanning consists in the turning of the skins of animals into leather by combining, chemically, the substance of the skin with *tannin*, an astringent ingredient.

TANNIN is made from Gall Nuts, which are found upon certain species of oak, and also occurs in a number of other trees and plants. The galls are formed by the female insect *Cynips* by piercing the buds of a variety of oak called *Quercus infectoria* and there depositing its eggs. These, producing irritation, cause the sap of the plant to flow toward the wound, thus forming a vegetable tumor or gall. The principal species of oak which yields the Gall Nuts of commerce is the *Quercus infectoria.*

There are a large number of processes by which *tannin* is obtained; owing to lack of space we will give but one process, known as Pelouze's Process. By this process, tannin—or tannic acid, as it is sometimes called—is obtained by means of a percolator fitted into a receiver. The percolator is a cylindrical glass vessel, open at both ends, the upper opening being fitted with an air-tight stopper, and the lower end adjusted to the neck of the glass receiver. The upper vessel, or percolator, is about half filled with coarsely-powdered galls, which are prevented from falling through the lower opening by a plug of cotton; the powder is then covered with ether, which has been previously shaken up with a little water. (It is well

to state here that it is absolutely necessary that the ether should be agitated with water, otherwise not a fraction of tannin will be obtained.) The stopper is now inserted in the mouth of the percolator and the mixture allowed to digest for several hours, after which the stopper is withdrawn and the liquid allowed to filter into the receiver beneath. When all the liquid has passed through, the powdered galls are washed with more ether, introduced at the top as before. After standing for a short time, the filtered liquor will be found to separate into two distinct strata of unequal density. The tannic acid and gallic acid, being both extracted by the mixture of ether and water, now separate; the lower stratum being a solution of tannin (generally of an amber color) in water, and the upper stratum an etherial solution of other substances contained in the galls, the most important of which is *Gallic acid.* The two solutions are next separated; the aqueous solution of tannin is gently evaporated at a temperature not exceeding 212° Fahr. The result is an amorphous, or uncrystallized, mass of tannin, nearly if not quite pure, the yield being frequently about 40 to 45 per cent of the weight of galls used. The ether in the lighter liquid is recovered by distillation, over a water bath, with the aid of a Liebig's condenser, supplied with ice-cold water.

One method of salting hides consists in spreading the hides open upon the ground and sprinkling the flesh side with salt, but more liberally at the edges and along the spinal parts. The hides are then folded or doubled lengthwise down the centre; the remaining folds are made over each other, commencing with the shanks; next the peak of the belly upon the back; afterwards the head upon the tail part, and the tail part upon the head; and, lastly, doubling the whole with a final fold, and forming a square of about two feet. This being done, they are piled three or four together, and left until the salt has dissolved and penetrated their tissue, which is generally in about three

or four days. Thus preserved they are sent to market. Skins may be dried, even after having been salted, by stretching them upon poles, with the flesh side outwards, and exposing them to dry air in a shady place. Ten pounds of salt in summer, and somewhat less in winter, are requisite for each skin of ordinary size.

TANNING OF SKINS WITH FUR ON.—After softening the skin by soaking, cut off all useless parts, and, having removed all fatty substance from the inside, soak it for one hour in warm water. After this mix for each skin about a half ounce of sulphate soda, a half ounce of borax, and a half ounce of saltpetre with enough water to make a thin paste. Then take a brush and cover the inside of the skin with this paste, being careful to apply more to the thick parts than to the thin. Fold the skin, flesh side in, and put it in a cool place for twenty-four hours. Melt slowly together, without being allowed to boil, two ounces of hard white soap, one ounce of sal-soda, and a half ounce of borax; apply this mixture to the skin with a brush, in the same way as before, after having washed the skin clean. Then double the skin together, the same as before, and put it in a warm place. After allowing it to remain for twenty-four hours, dissolve, in enough hot rain-water to saturate the skin, two ounces saleratus, four ounces alum, and eight ounces salt; when this solution is cool enough not to burn the hands, place the skin in it and allow it to soak for twelve hours; then hang it up to dry, after wringing out. Repeat this soaking and drying several times until the skin has reached a sufficient degree of softness; then even off the surface of the inside with pumice stone or sand-paper.

DEPILATION BY SULPHIDE OF SODIUM.—Dissolve four or five pounds of the sulphide in each gallon of water. Form this into a thin paste with lime or pipe-clay. The paste is to be spread evenly over the hair side of the hide, which is effected by one workman pouring it from a pail

down the middle of the hide, while another, with a mop, rubs it into every part. The hide is then folded into a cushion and set aside. In from fifteen to twenty hours it will be ready for unhairing, when it will be found that the hair is reduced to a pulp and therefore totally destroyed. In the above concentrated condition the hair would doubtless be destroyed in less than an hour. The hides are now thrown into cold water, to wash away the sulphide and to enable them to plump. The sulphide being highly caustic, it will, if not removed by washing, attack the nails and skin of the workmen, who should be thoroughly cautioned as to its use, otherwise they will soon suffer from "alkaline sores" of a most painful character. This method of unhairing gives good weight, as also tough and solid leather, but it requires to be used with very great care. If not spread evenly upon the hide, patches of hair may remain upon the pelt which will be troublesome to remove afterwards. Unless the hides, after being treated by the sulphide, are plumped by steeping in weak lime, the fleshy matters will be difficult to remove on the beam. Raising by acid is also considered necessary, since the sulphide itself has but little plumping effect. In applying this process to dressing hides, the sulphide is used in a more diluted condition, the hides being suspended in a solution of the sulphide, three-quarters of a pound being used to a hide. After suspension in this solution for about twenty-four hours the hides are in the condition for unhairing, after which they are limed to plump or swell them. Now and then sulphide of sodium fails to wholly remove the epidermis, producing ugly stains on the leather. In a case of this kind, treat the imperfectly depilated skin with milk of lime, which removes all trace of the epidermis very quickly.

Funcke's Tanning Process.—The unhaired skins or hides are passed through a solution of commercial soda, and then hung up until nearly dry before subjecting them

to the tanning process. The skins are immersed in a solution of bark or other tanning material, to which is added a dilute vegetable acid. By this solution the pores of the skin are opened while being exposed to the action of the tannic acid. The skins are again subjected to the action of a stronger solution of the vegetable acid, and its action is mollified by the addition of a solution of sugar. Finally, while the skins are subjected to the usual handling, they are treated with a solution of tannic acid until the leather is finished; but since the tanning liquor used in this process is of such strength as to impart too deep a color for most purposes, the color is reduced, when requisite, by adding, in the last stage of the process, sulphuric acid and salt to the tanning liquor in which the skins are worked. The skins are partially dried after each operation before submitting to the next.

A New Tanning Process.—In this process the hides are subjected to two solutions, mixed as follows: for the first solution, dissolve in twenty to thirty parts of wood vinegar, twenty to thirty parts of chromate of alumina, and dilute with water to one thousand parts; for the second solution, dissolve in ammonia some ammonio-nickel chloride compounded with a concentrated solution of tartar. After carefully freeing the hides from lime, place them in a mixture composed of two parts of the first solution and one part of the second. For thick bullock hides eighteen to twenty-one days are adequate.

Page's Tanning Process.—By this process the hides and skins are limed in weak and strong solutions, unhaired, drenched in hen manure or other suitable bate, and immersed and *handled* in coloring liquors made from equal parts of any suitable bark and sweet fern, cutch and sweet fern, or gambier and sweet fern. A mixture is then prepared with the following ingredients: forty parts of common salt, chloride of potassium, or ammonium, forty parts of alum, and thirteen parts of saltpetre. These are

thoroughly mixed and dissolved in four vats half-filled with water. The vats measure six feet by four, and are numbered 1, 2, 3, and 4. One-third more of the mixture is put into 3 and 4 than into 1 and 2. After a *salt solution* has been thus prepared, a *tin solution* is prepared as follows: to two gallons of the stronger salt solution are added two quarts of oil of vitriol, two gallons of muriate of tin of 140° to 150° Twaddell, twenty-eight gallons of muriatic acid of 20° to 30° Baumé, and two gallons of nitric acid of 36° to 40° B. The hides are tanned by being immersed in the four vats successively; one pint of the tin solution being first added to the solutions in vats 3 and 4, and one pint added to each of these solutions whenever a fresh lot of hides are put in. The coloring liquor first described may, if desired, be made without sweet fern or exclusively from sweet fern. The tanning is said to occupy a very short time, and the leather produced is stated to be exceedingly tough and close in fibre.

TANNING BY A QUICK PROCESS.—The skins are placed in a hermetically closed fulling trough, after having been put through the usual running-water treatment. To every hundred pounds of skins, to be weighed when taken from the water, a mixture of one pound of sulphate of copper, twenty pounds of bark of oak root, thirty pounds of divi-divi, thirty pounds of alum, and sixty-five pounds of acidulated barley meal is contained in the water in the fulling trough. In place of sulphate of copper, sulphate of ammonia or sulphate of zinc may be substituted; other materials containing tannin may be used in place of divi-divi and bark of oak root; and alum may be substituted by sulphate of alumina. When the skins are in the fulling trough they are turned, for twenty-four hours, repeatedly; the hides are then put in a common vat together with the tanning fluid, and are taken out and put back again, daily, from fifteen to twenty days. At the end of this time they are transferred to an ordinary pit and put in tan; here

they are allowed to remain from fifteen to thirty days, when the process is completed. The feature of this process is that in the presence of sulphate of copper, tannin and alum are used at the same time.

SIX DESIGNS FOR FINISHED FENCES.

In this illustration we represent half a dozen designs for finished fences.

No. 1 has a boxed post fourteen inches square, made of inch-and-a-quarter or inch-and-a-half pine plank, secured to a locust post which is set three and a half feet in the ground.

The fence is about five feet high, and is made of plank strips about eight inches wide, the outsides of which are sawed to a pattern and placed about an inch apart, and secured at the top and bottom by string pieces, with a moulding on the outside near the bottom and a heavy cap on the top. The work is all neatly planed, and the whole should be painted and sanded.

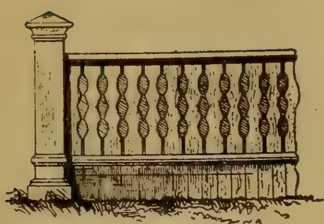
No. 2 has a stone post about two feet square, and a stone base two and a half feet high, set three and a half feet in the ground. The sill is of pine, 4x12-inch stuff, beveled on top, and the fence itself above this is made similar to No. 1.

No. 3 is a tight board fence, made of tongued and grooved plank, put together with white lead in the joints. It has a moulded base about twelve inches high, and a heavy cap covering the top edges. Just below the cap a scrollwork, sawed out of inch-and-a-half stuff, is planted on the face, and under this is a heavy belt moulding.

No. 4 has a cased post and a tight wooden bottom about two feet high, and on this is put an iron railing, which is screwed fast to both, and to locust posts put at intervals of

about seven feet, or braced by iron rods to dwarf posts set inside the fence.

No. 5 is similar to No. 1, except that the strips are only



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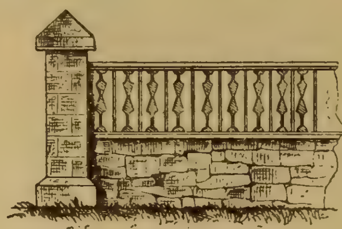

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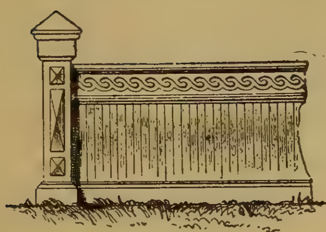

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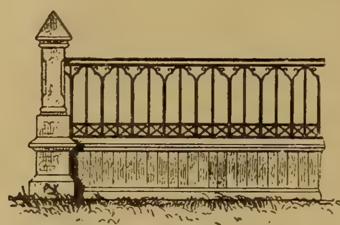

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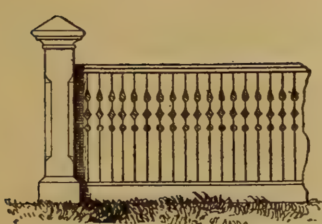

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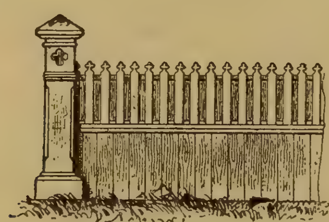

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five inches wide, and are set only about one-quarter to one-third of an inch apart, and the sawing is all near the top.

No. 6 has a tight board bottom, and above it open pickets of four-inch stuff, placed four inches apart, and the tops sawed in a trefoil pattern.

SIX RUSTIC FENCES.

Our designs for fences would hardly be complete without a few suggestions in the way of rustic fences; accordingly in this illustration we exhibit half a dozen examples of them in their more simple and easily constructed forms.

Designs of this sort may be varied almost to infinity, according to the taste of the workman and the materials with which he has to work. A skillful person, in a ramble of a couple of hours in the woods, may pick up hundreds of different kinds of twists and crooks, all of which he may make use of, and by the exercise of a little ingenuity in the combination of these crooked pieces with straight ones, he may work up a very pretty design. In building a run of, say, a hundred feet, he may make the different sections all dissimilar, and by dividing each section into a number of smaller panels, as shown in the second figure of the illustration, he may make a very great variety of pretty patterns. This figure shows a section of about eight feet, divided into four panels. Straight pieces are used for strength, and the filling-up is of the crooked stuff.

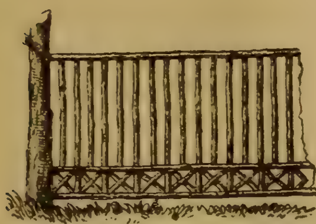
The heavy posts which divide the sections should be from six to eight feet apart—not over eight—and should be set from three and a half to four feet in the ground; and it would be well to char the ends, as by so doing the possibilities are that the posts will last longer than if not.

Red cedar is the best material, though sometimes white oak and sometimes locust is used.

Designs Nos. 1, 3, and 5 all have solid posts made of trunks of cedar trees.

Nos. 2 and 4 have cedar or locust posts, boxed out with

rough boards, and then covered over with strips of small stuff split, and the flat side nailed to the boxing.



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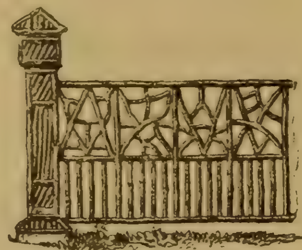

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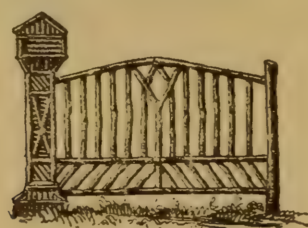

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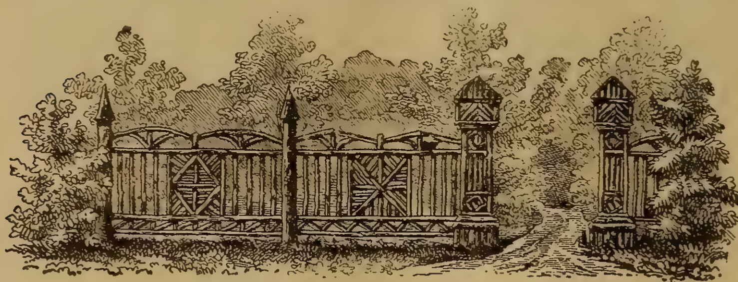
No. 6 has a very rough stone post, and a dwarf wall sixteen inches thick, coped with a rough blue-stone coping, and surmounted by rustic work secured by iron fastenings.

TWO RUSTIC GATEWAYS.

This illustration represents two designs for rustic gateways.

No. 1 is a small gateway and two sections of a rustic



1

2

fence, slightly differing from each other in design, and con structed in a manner similar to those on page 875.

No. 2 is a carriage gateway suitable for an entrance to a gentleman's place. The gate-house is seen on the right, just within the fence. The central part, for carriages, is twelve feet wide, and the gates are in two parts. The smaller ones are four feet wide each. The one on the left may be made stationary, it having been introduced only for the purpose of giving a balance to the different parts of the design.

To Estimate Live Cattle.

Measure girth back of the shoulder and immediately behind the front legs, and from the root of the tail to a point even with the shoulder blade. Multiply them together and divide the result by 144, and then multiply this result by the following:

For a girth of 7–9 ft.	31 lbs.
" " 5–7 ft.	23 lbs.
" " 3–6 ft.	16 lbs.
" " less than 3 ft.	11 lbs.

In the case of half-fat cattle deduct $\frac{1}{20}$, and in that of the very fat add $\frac{1}{20}$ to this result. Thus, what is the weight of a fat steer 6 ft. 3 in girth, 5 ft. 4 in length? 75 in. (6 ft. 3) ×64 (5 ft. 4 in.)=4800. 4800÷144=$33\frac{1}{3}$. And $33\frac{1}{3}$ multiplied by 23=$766\frac{2}{3}$; add $\frac{1}{20}$ of $766\frac{2}{3}$ (the steer is fat), or $38\frac{1}{3}$, and we have 805 lbs.

This is an approximating rule, not a demonstrated one, and must be corrected by the user's experience in special cattle.

Table Showing the Price Per Dozen,

When the number sold for a Quarter is given.

In some localities articles such as eggs, lemons, oranges, etc., are sold at so many for a quarter of a dollar, and it is often important to know what rate this is per dozen. The rule for calculating it is very simple: Divide 300 by the number that is sold for a quarter, and the quotient is the price per dozen in cents. In many cases the answer contains a fraction, and when this fraction is other than a quarter, third, half, or three-quarters of a cent, we have given the nearest of these fractions in the answer:

No. for a Quarter.	*Price per doz.*	*No. for a Quarter.*	*Price per doz.*
1	$3.00	16	18¾
2	1.50	17	17½
3	1.00	18	16⅔
4	75	19	15¾
5	60	20	15
6	50	21	14⅓
7	43	22	13½
8	37½	23	13
9	33⅓	24	12½
10	30	25	12
11	27	26	11½
12	25	27	11
13	23	28	10¾
14	21½	29	10⅓
15	20	30	10

Bricks.

Bricks vary in size according to locality of manufacture. An *ordinary* brick is 8¼×4×2, and still another "ordinary" brick is 8×4¼×2½ and 7¾×3⅝×2¼. To calculate in the school method would make a long and tedious calculation; nevertheless, for the sake of proving *results*, it may be used. A matter that must be taken into consideration is the mortar between the joints, which makes more difference than would be ordinarily suspected. Thus, if an ordinary brick 8¼×4×2 (=66 cubic inches), with mortar ⅛ inch thick, it requires about 23⅗ (23.6) bricks to a cubic foot of masonry; with mortar ¼ inch thick, it requires 21¼ bricks; with mortar ⅜ inch thick, 19⅓ bricks; and with mortar ½ inch thick, 17½ bricks. To ascertain the bricks in a wall, ascertain the number of cubic feet in the wall, and multiply by one of these figures (according to the mortar joint), thus:

What is the number of bricks required for a wall of 50 feet long, 10 feet high, 25 inches thick; mortar joints ⅛ inch?

We have 50×10×2$\frac{1}{12}$ feet (25 inches is equal to 2$\frac{1}{12}$ feet) =1041⅔ cubic feet, and this multiplied by 23.6=24583 bricks.

If the brick is larger or smaller than the standard brick chosen ($8\frac{1}{4}\times4\times2$), state a proportion as follows:

As the cubic inches in regular brick : 73 (cubic inches in standard, with mortar attached) : : the number of bricks found as above : to the number required.

For example, suppose there is a brick that measures 80 cubic inches with mortar attached; how many such bricks would be required to build a wall, measurement as in the last example? Say,

80 : 73 : : 24370 : to bricks required, which is

$$\frac{24370\times73}{80}=22237 \text{ bricks required.}$$

But there is a simpler way. The face of the wall is 50 feet$\times$10 feet$=$500 square feet. The ordinary brick with its joint measures on its *end* and *face* $4\frac{1}{8}$ (4.125) inches$\times2\frac{1}{8}$ (2.125), which gives an *area* of 8 765, and this divided into 500 square feet (72000 square inches) gives 8214.5 bricks for a wall *one* brick (in length) thick; but the wall in question is 3 bricks through, hence it will require 3 times 8214.5$=$24643.5. In large, plain walls 3 per cent will do to add for waste, but if there are corners, or many doors or windows, 5 per cent must be added.

Another Method.

Measuring by squares of 100 *sq. ft.*

RULE.—Multiply the superficial area (face of the wall) by as many half-bricks as will make the thickness of the wall, and divide this result by 3 to get the number of feet. In the above example $20\times12\times4=960$. Divide by $3=320=3\frac{1}{5}$ squares.

Another Method.

A rough rule is to calculate 22 bricks (without considering the mortar) to the cubic foot. This gives about 10 per cent. too little. When the percentage is *known*, it will do to compute from.

In some parts of the country, brick is laid by the 100 cubic feet—called a "square"—that is, by the 100 square feet one foot thick. To reduce work of any dimensions to this measurement, proceed thus, say, to get the workman's dimensions for a wall 20 feet long, 12 feet high, and two bricks (in length) thick : $20 \times 12 \times 1\frac{1}{3}$ (bricks 8 long each) $=320$ feet$=3\frac{1}{5}$ square.

Another Brick Measurement.

Number of bricks required in wall per *square foot* of face of the wall :

Thickness of wall				
½ brick	(length)	requires	7½	bricks.
1 "	"	"	15	"
1½ "	"	"	22½	"
2 "	"	"	30	"
2½ "	"	"	37½	"

Walls of greater thickness in direct proportion.

New York Rule for Bricks.

New York bricklayers reckon 7 bricks to every foot of surface—a *half brick thick.* A wall 12 ft. long, 10 ft. high, and 4 in. thick would contain $12 \times 10 \times 7=840$. This makes full allowance for waste.

Stone Measure.

Stone is now laid by cubic yard (or foot) in large work. To obtain dimensions in c. yds. multiply length, breadth, and thickness (in feet) of wall and divide by 27. Count walls under 16 in. as 16 in.; count wall of 16 in. thickness or over at its actual measurement. Thus : what are the dimensions of a wall 27 ft. long, 12 ft. high, and 15 in. thick ? It will be $27 \times 12 \times 1\frac{1}{3}$ (16 in.$=1\frac{1}{3}$ ft. instead of 15) $=432 \div 27=16$ c. yards.

Suppose dimensions 27 ft. long, 12 ft. high, and 17. in. thick, the measure would be $27 \times 12 \times 1\frac{5}{12}$ ft. (17 in.) $=459$ cubic feet, and this divided by 27 gives 17 c. yards.

A quarryman's *perch* (old style of measurement) is 24.75 c. feet; a mason's is 22 c. feet. That is to say, a mason's perch is represented by a pile $16\frac{1}{2}$ ft. long, 1 ft. high, and 16 in. or less thick; a quarryman's by $16\frac{1}{2}$ ft. in length, 1 ft. high, and 18 in. thick. These standards are superseded by the c. yard, as aforesaid.

Land Measurement, etc.

7.92 inches constitute 1 link of Gunter's chain; 100 links, 1 chain, 4 rods or poles, or 66 feet, and 80 chains one mile. A square chain is 16 square poles, and 10 square chains are 1 acre. Four rods are an acre, each containing 1210 square yards, or 34.785 yards, or 34 yards 28 inches each side.

Forty poles of 30.25 square yards each is a rood, and a pole is $5\frac{1}{2}$ yards each way.

An acre is 4840 square yards, or 69 yds., 1 ft., $8\frac{1}{2}$ in. each way; and 2 acres, or 9680 square yds., are 98 yds., 1 ft., 2 in. each way; and 3 acres are $120\frac{1}{2}$ yds. each way. A square mile, or a U. S section of land, is 640 acres, being 1760 yds. each way; half a mile or 880 yds. each way is 160 acres; a quarter of a mile or 440 yds. each way is a park or farm of 40 acres; and a furlong or 220 yds. each way is 10 acres.

Any length or breadth in yards which multiplied makes 4840 is an acre, any which makes 12.10 is a rood, and 30.25 is a pole.

An English acre is a square of nearly 70 yds. each way, a Scotch of $77\frac{1}{2}$ yds., and an Irish of $88\frac{1}{2}$ yds.

A field of any of these dimensions contains one acre:

5 yards	wide	by	968 long.	10 yards	wide	by	484 long.
20	"	"	242 "	40	"	"	121 "
80	"	"	$60\frac{1}{2}$ "	70	"	"	$69\frac{1}{7}$ "
30	"	"	$161\frac{1}{3}$ "	55	"	"	88 "
50	"	"	$96\frac{4}{5}$ "	47	"	"	103 "
16	"	"	$302\frac{1}{2}$ "	59	"	"	82 "

The side of a square to contain

1 acre, 208.71 feet; 12.65 rods; 64 paces.
½ acre, 147.58 feet; 8.94 rods; 45 paces.
⅓ acre, 120.50 feet; 7.30 rods; 37 paces.
¼ acre, 104.36 feet; 6.32 rods; 32 paces.
⅛ acre, 73.79 feet; 4.47 rods; 22½ paces.

Table giving proportions of an acre in square feet in a lot less than an acre:

Square feet.	100ths of acre.	Square feet.	100ths of acre.
436	.01	11326	.26
871	.02	11761	.27
1307	.03	12197	.28
1742	.04	12632	.29
2178	.05	13068	.30
2614	.06	13504	.31
3049	.07	13939	.32
3485	.08	14375	.33
3920	.09	14810	.34
4356	.10	15246	.35
4792	.11	15682	.36
5227	.12	16117	.37
5663	.13	16558	.38
6098	.14	16988	.39
6534	.15	17424	.40
6970	.16	17860	.41
7405	.17	18295	.42
7841	.18	18731	.43
8276	.19	19166	.44
8712	.20	19602	.45
9148	.21	20038	.46
9583	.22	20473	.47
10019	.23	20909	.48
10454	.24	21344	.49
10890	.25	21780	.50

SMALL LOTS.—The following measurements will be found useful:

$52\frac{1}{6}$	ft. sq.,	or $2{,}722\frac{1}{2}$	sq. ft.	$=\frac{1}{16}$	of an acre.
$73\frac{2}{3}$	"	" 5,445	"	$=\frac{1}{8}$	"
$104\frac{1}{3}$	"	" 10,890	"	$=\frac{1}{4}$	"
$120\frac{1}{2}$	"	" 14,520	"	$=\frac{1}{3}$	"
$147\frac{7}{12}$	"	" 21,780	"	$=\frac{1}{2}$	"
$208\frac{2}{3}$	"	" 43,560	"	$=1$ acre.	

TO FIND THE NUMBER OF ACRES IN A BODY OF LAND.—*Rule:* Multiply the length by the width (in rods), and divide the product by 160; the result will be the answer in acres and hundredths.

When the opposite sides of a piece of land are of unequal length, add them together and take one-half for the mean length or width. Multiply this by the depth, and divide by $31\frac{1}{4}$. This will give the result required.

TABLE FOR CALCULATING WAGES, FROM ONE HOUR TO SIX DAYS, AT FROM $1 TO $20 PER WEEK.

For 6 *Days.*	1 *Day.*	2 *Days*	3 *Days*	1 *Hour.*	2 *Hours*	3 *Hours*	4 *Hours*	5 *Hours*
$1.00	.16⅔	.33⅓	.50	.01⅔	.03⅓	.05	.06⅔	.08⅓
1.50	.25	.50	.75	.02½	.05	.07½	.10	.12½
2.00	.33⅓	.66⅔	1.00	.03⅓	.06⅔	.10	.13⅓	.16⅔
2.50	.41⅔	.83⅓	1.25	.04⅙	.08⅓	.12½	.16⅔	.20⅚
3.00	.50	1.00	1.50	.05	.10	.15	.20	.25
3.50	.58⅓	1.16⅔	1.75	.05⅚	.11⅔	.17½	.23⅓	.29⅙
4.00	.66⅔	1.33⅓	2.00	.06⅔	.13⅓	.20	.26⅔	.33⅓
4.50	.75	1.50	2.25	.07½	.15	.22½	.30	.37½
5.00	.83⅓	1.66⅔	2.50	.08⅓	.16⅔	.25	.33⅓	.41⅔
5.50	.91⅔	1.83⅓	2.75	.09	.18⅔	.27½	.36⅔	.45⅚
6.00	1.00	2.00	3.00	.10	.20	.30	.40	.50
6.50	1.08⅓	2.16⅔	3.25	.10⅚	.21⅔	.32½	.43⅓	.54⅙
7.00	1.16⅔	2.33⅓	3.50	.11⅔	.23⅓	.35	.46⅔	.58⅓
7.50	1.25	2.50	3.75	.12½	.25	.37½	.50	.62½
8.00	1.33⅓	2.66⅔	4.00	.13⅓	.26⅔	.40	.53⅓	.66⅔
8.50	1.41⅔	2.83⅓	4.25	.14⅙	.28⅓	.42½	.56⅔	.70⅚
9.00	1.50	3.00	4.50	.15	.30	.45	.60	.75
9.50	1.58⅓	3.16⅔	4.75	.15⅚	.31⅔	.47½	.63⅓	.79⅙
10.00	1.66⅔	3.33⅓	5.00	.16⅔	.33⅓	.50	.66⅔	.83⅓
10.50	1.75	3.50	5.25	.17½	.35	.52½	.70	.87½
11.00	1.83⅓	3.66⅔	5.50	.18⅓	.36⅔	.55	.73⅓	.91⅔
11.50	1.91⅔	3.83⅓	5.75	.19⅙	.38⅓	.57½	.76⅔	.95⅚
12 00	2.00	4.00	6.00	.20	.40	.60	.80	1.00
13.00	2.16⅔	4.33⅓	6.50	.21⅔	.43⅓	.65	.86⅔	1.08⅓
14.00	2.33⅓	4.66⅔	7.00	.23⅓	.46⅔	.70	.93⅓	1.16⅔
15.00	2.50	5.00	7.50	.25	.50	.75	1.00	1.25
16.00	2.66⅔	5.33⅓	8.00	.26⅔	.53⅓	.80	1.06⅔	1.33⅓
17.00	2.83⅓	5.66⅔	8.50	.28⅓	.56⅔	.85	1.13⅓	1.41⅔
18.00	3.00	6.00	9.00	.30	.60	.90	1.20	1.50
19.00	3.16⅔	6.33⅓	9.50	.31⅔	.63⅓	.95	1.26⅔	1.58⅓
20.00	3.33⅓	6.66⅔	10.00	.33⅓	.66⅔	1.00	1.33⅓	1.66⅔

NOTE.—If the required sum is not in the table, double some number; for instance, if the salary or wages is $30.00, double the sum opposite $15.00, and so on with the rest.